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The Evolution of Time Sensitive Targeting:

Operation Iraqi Freedom Results and Lessons

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Executive Summary

The nature of US military operations since DESERT STORM has gradually shifted from a conventional force-on-force scenario to one in which US forces likely will counter an adversary strategy of concealment, dispersal, and deception. Airmen at the operational and tactical levels of combat have adapted the US targeting cycle to accommodate targets discovered during Air Tasking Order (ATO) execution that cannot wait to be processed under the traditional 24-72 hour ATO targeting cycle. The highest priority target category of these emerging targets are defined as Time-Sensitive Targets (TST). This study will trace the requirement for and evolution of the TST process beginning with the Scud hunt in the first Gulf War. It will summarize the TST progress through Operations ALLIED FORCE and ENDURING FREEDOM, and then analyze the targeting process and results of Operation IRAQI FREEDOM (OIF). This analysis will cover broad operational-level results and observations, and will address a few key TST-related lessons from OIF and provide recommendations to further improve the immediate targeting process execution.

Data sources include draft lessons, doctrine, and/or tactics revisions, Congressional testimony, oral histories, briefings, interviews, and the author's interaction with the TST Team and immediate targeting process during OIF as a Combined Air Operations Center (CAOC) Senior Offensive Duty Officer at Prince Sultan Air Base, Kingdom of Saudi Arabia.

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Chapter 1

Introduction

"If you want to learn lessons from warfare, look to failures, and our inability to stop the Iraqis from launching ballistic missiles certainly could be considered a failure. That is a lesson that's not going to be lost on other people…"

Lieutenant General Chuck Horner
CFACC, Operation DESERT STORM[1]

"Time-Sensitive Targets: Those targets requiring immediate response because they pose (or will soon pose) danger to friendly forces or are highly lucrative, fleeting targets of opportunity."

Joint Publication 1-02
DOD Dictionary of Military and Associated Terms[2]

The nature of US military operations since DESERT STORM has gradually shifted from a conventional force-on-force scenario to one in which US forces likely will counter an adversary strategy of concealment, dispersal, and deception. Over the last decade, airmen at the operational and tactical levels of combat have had to adapt the US targeting cycle to accommodate targets discovered during Air Tasking Order (ATO) execution that cannot wait to be processed under the traditional 24-72 hour ATO targeting cycle. While these targets are sometimes referred to by different names among the services, the highest priority target category as defined above are Time-Sensitive Targets (TST).

The US military's successful joint development of an efficient process to Find, Fix, Track, Target, Engage, and Assess (F2T2EA) emerging battlefield targets coupled with advances in command and control automation with fused intelligence data has resulted in a significant US military capability to counter adversaries' asymmetric strategies. Predominantly from the air component's operational viewpoint, this study will trace the requirement for and evolution of the TST process beginning with the Scud hunt in the first Gulf War. It will summarize the TST progress through Operations ALLIED FORCE and ENDURING FREEDOM, and then analyze the targeting process and results refined during OIF. This analysis will cover broad operational-level results and observations, and where appropriate will note tactical level impacts on

operational execution. Finally, the study will address a few of the many TST-related lessons from OIF and provide recommendations to further improve the immediate targeting process execution.

This paper will not describe the detailed minute-by-minute description of OIF TST execution specifics, nor does it detail the basic TST process and the interactions between the Combined Force Commander and the components.

Although the OIF analysis and recommendations are based largely upon draft lessons, doctrine, and/or tactics revisions, many of the draft source documents are already being used in exercises by the USAF and joint community. Other sources for this paper include Congressional testimony, oral histories, briefings, interviews, and personal interaction with the TST Team and immediate targeting process during OIF as a CAOC Senior Offensive Duty Officer at Prince Sultan Air Base, Kingdom of Saudi Arabia.

Chapter 2

The Recent Evolution of Time-Sensitive Targeting

"It's like poking spaghetti up a wild cat's behind…you don't get much accomplished but you get a heck of a lot of scratch marks on your arm"

Lieutenant General Calvin Waller
Deputy Commander of CENTCOM during DESERT STORM
On the difficulty of finding Scuds[3]

The US concept and necessity for TST has changed since the first Gulf War in 1991. As potential US adversaries took note of the overwhelming US conventional warfighting capability brought to bear against Iraqi forces, they quickly realized the futility of attempting to defeat the US force-on-force. Instead, they devised asymmetric strategies for countering US conventional forces and targeted other key vulnerabilities. This chapter will focus on the strategic environment and adversary strategies that resulted in changes to the US joint targeting process, and review the evolution of the time-sensitive targeting process since Operation DESERT STORM (ODS).

Environment

Two important emerging characteristics that frame American popular support for military action are intolerance for excessive casualties and a demand for low collateral damage. There are numerous examples supporting the argument that casualty counts have become one measure-of-effectiveness of US military operations. For example, on the fifth day of OIF Secretary of State Colin Powell made the following statement on the progress of the operation:

> "Overall in the great sweep of things, casualties have been light. It has been a remarkable military operation so far."[4]

Secretary Powell's emphasis on casualties as opposed to military objective achievement is noteworthy, as is the emerging expectation of precision engagement with minimal to zero collateral damage and non-combatant casualties. The evolving precision engagement capability of US weapons systems and munitions has created the expectation of accuracy and perfection. During ODS it was common practice to show only aircraft weapon system video hits during media briefings, further reinforcing the expectation of success. The emphasis on low collateral damage is stressed at the senior levels of leadership, as demonstrated by the comments of Lt Gen T. Michael Moseley, the Combined Forces Air Component Commander (CFACC) for OIF:

"We are taking extraordinary measures to prevent noncombatant casualties. With our ability to control the skies, we use our command and control system to assess every proposed action, and we conduct all operations with great discipline and proportionality."[5]

Another key characteristic of the current strategic environment is that US adversaries have learned from the successes and failures of previous conflicts and adapted their strategies to try to minimize US conventional military advantages where applicable. They have evolved strategies involving dispersal, concealment, camouflage, and shoot-and-scoot employment tactics in order to counter excellent US intelligence, surveillance, and reconnaissance (ISR) capability. These collective adversary efforts, described in more detail in the following sections of this chapter, are focused on the goal of getting inside of the US decision cycle; how it adapts to changes in the battlespace, "in order to observe, orient, decide, and act at a faster rate than the adversary."[6]

In order to counter these adversaries' asymmetrical strategies, the US military has focused on both better ISR and shortening the decision cycle. *Joint Vision 2010* highlights that "dominant battlespace awareness will improve situation awareness, decrease response time, and make the battlespace considerably more transparent." At the same time, AFDD-1 focuses the dominant awareness upon countering adversary movements with unprecedented speed, agility, and precision.[7] The documented focus in joint and airpower doctrine on shortening the targeting decision cycle grew out of previously demonstrated shortcomings in US military operations.

Operation DESERT STORM

The targeting decision-cycle wakeup call for the US military occurred during the opening week of combat in ODS. After the first couple of Iraqi Scud missile launches toward Israel, it became apparent Saddam Hussein was trying to force Israeli intervention to effect the fracturing of the US constructed coalition. It also became apparent that there was no formal command and control process in the Air Operations Center (AOC) for finding and destroying fleeting or emerging targets like Iraqi Scuds. Most ODS real-time (or dynamic) targeting solutions were ad-hoc workarounds due to a lack of service and joint Tactics, Techniques, and Procedures (TTPs). Although the Scud threat and the likelihood that Israel would be targeted had been identified prior to ODS, the primary coalition defensive counter-strategy was to deploy Patriot systems to protect coalition forces and bases, as well as key Israeli cities. The political pressure resulting from the continued Scud launches against Israel forced CENTCOM to take more active measures to suppress Scuds.

The US inability to find and destroy dispersed Scud launchers detracted from the overall joint air campaign effort by redirecting a large proportion of available aircraft to destroy Scuds that the coalition could not physically locate. In many instances, the command and control and Air Tasking Order process could not adequately adapt in time to investigate a newly identified launch site. The Deputy Commander of CENTCOM, Lt Gen Calvin Waller, summed up the difficulty of counter-Scud operations as follows:

"Well it is an enormous task to go out using high performance aircraft, trying to hit fleeting targets, much like the Scuds, much like trying to find a tank that's moving around or an artillery piece that's moving around, or mobile divisions or

mobile units and so forth who can pick up and move from the time you launch an aircraft to the time it gets over the target, it may have moved, it may not be there any more, so it is hard to find."[8]

By the fourth day of the air war, Scuds had politically and militarily become the number one targeting priority. The Joint Forces Air Component Commander (JFACC), Lt Gen Chuck Horner, began apportioning 600-700 combat sorties each day against counter-Scud operations in Western and Southern Iraq, pulling them away from the strategic campaign still underway in Baghdad and the shaping operations against the Republican Guard in the south. In some cases strike packages were retasked to attack "possible Scud launchers" as they stepped to their aircraft, without adequate target area descriptions and even though it would be hours until they were over the target area.[9] Roughly half of the LANTIRN-equipped aircraft in theater were eventually dedicated to airborne Scud alert. In the end around 2500 sorties were tasked with Scud hunting, with 1500 strikes against Scud-related sites or production facilities. It is important to note that a significant portion of the remaining sorties went on to attack other legitimate targets. Nevertheless, there was <u>not one</u> confirmed Scud destroyed by coalition aircraft.[10] General Waller also characterized CENTCOM's frustration with the overall effort:

> "Once Saddam Hussein launched those Scuds, it was one of the most non-productive times that I think that we had during the conflict. Why do I say that? I say that because we had to divert an enormous amount of time, energy, combat resources into trying to find these mobile launch Scuds, we had a great appreciation for what was happening in Israel and how the people in Riyadh and other parts of Saudi Arabia felt about the Scuds being launched in their directions and so forth, and I don't want to diminish for one minute how these people felt, but on the other hand I would like for people to understand and appreciate that our primary mission was to bring Saddam Hussein and his military machinery to their knees and to do what the United Nations had asked us to do and that was to get him out of the sovereign state of Kuwait and here we were devoting an awful lot of our energies and time and combat power to looking for these Scud missiles."[11]

Even though a significant number of ISR assets were dedicated towards the Scud hunt, the overall coalition effectiveness was disappointing. Because the Iraqi tactic was to shoot and relocate, often a Scud launcher would be five miles away from its launch site within 10 minutes after launching a missile.[12] The result was that unless there were assets practically overhead the site at missile launch, it was very unlikely that a launcher would ever be found near a detected launch site. In the end, the US-led coalition could not maintain situational awareness nor employ ISR sources to "effectively detect, locate, and identify" CENTCOM's highest priority targets, the Scud launchers. Additionally, for those emerging targets that were identified, "the Joint Force Commander (JFC) and components lacked the ability to select, task, deconflict, and synchronize available forces and weapons systems."[13] The failure of Scud-hunt operations in ODS would not be forgotten; counter-Scud operations would become a benchmark capability of US offensive operations 12 years later in Iraq.

Operation ALLIED FORCE

The US-led NATO military operation against Serbian forces in and around Kosovo in 1999 is another excellent example of the evolution of TST process. Like the Iraqi military of ODS, the Serbian military during Operation ALLIED FORCE (OAF) was equipped with mostly Soviet-made hardware including short and long-range radar-guided SAMs, AAA, and MIG-29 Fulcrum fighters. However, the Serbians were better trained than their Iraqi counterparts and had been keenly observing American doctrine and tactics in Iraq since the first Gulf War. Their SAM operators exercised excellent emission control (EMCON) to complicate NATO detection and engagement capability, and when they did engage NATO forces employed shoot and relocate tactics to further complicate coalition efforts to locate and destroy the offending system. Also, the Serbian military smartly did not mass ground forces. The public acknowledgement by President Clinton and the Chairman of the Joint Chiefs ruling out any NATO ground force allowed Serbian President Milosevic to conceal and disperse his ground forces into the rugged, forested terrain of Kosovo.[14]

When it became obvious to NATO senior leaders during the second week of OAF that a simple military show-of-force was not going to bring Milosevic to the negotiating table, the air war progressed to the second planned phase concentrating on interdicting Serbian fielded forces: supply lines, logistics assembly areas, and Serb Army concentrations. As pointed out previously, there initially were no concentrations of massed Serb forces per se. Serb force dispersion coupled with the concealing terrain and foliage complicated NATO ISR efforts to detect and identify Serb targets, and resulted in vocal frustration from senior US military leaders that sounded similar to that expressed during the ODS Scud hunt. In order to improve effectiveness against this difficult target set, General Wesley Clarke, Supreme Allied Commander Europe and overall commander of OAF, requested the deployment of an additional 300 combat aircraft to the theater.[15]

Flex Targeting. It is remarkable that, notwithstanding the documented lessons of DESERT STORM regarding the absence of a command and control process for emerging targets (specifically the Scud hunt in that case), there initially was no process or team in the CAOC to deal with targets that emerged during the current ATO execution that could not wait for inclusion into the normal 24-72 hour ATO development process. Similar to the Gulf War, an ad-hoc "flex targeting" team was finally assembled in the CAOC prior to the end of the first month of the OAF campaign. This team had the responsibility for coordinating coalition efforts to detect, identify, and engage emerging Serbian targets that could not wait for inclusion into a subsequent ATO.[16]

The CAOC and flex targeting cell developed three different approaches to deal with the problem of engaging emerging targets. The first was to apportion ATO sorties to "alert flex" against emerging targets identified during the current ATO execution. Sorties assigned this mission initially were placed on ground alert, but because of the up to two-hour transit times from alert bases to the target areas were eventually directed to maintain airborne alert with an accompanying tanker aircraft, awaiting tasking from a command and control authority.[17] With excess sortie availability as was the case in OAF, these missions had little negative impact on the CAOC's ability to prosecute the remaining ATO objectives since the alert flex sorties were

additive. In a different scenario with more limited airpower resources the inclusion of alert flex missions must be carefully weighed against potential negative impacts on efficiency; if the sorties allocated towards potential flex targets do not achieve any appreciable effect, then they might be more efficiently apportioned to achieve the other desired effects within that ATO cycle.

The second approach used was to "rerole" missions either on the ground or airborne that had been previously tasked in the ATO to hit a preplanned target. This approach tended to have a more negative effect on ATO execution as it diverted resources away from completing a previously identified and prioritized military objective. Although these occurred during OAF, reroles were the exception because of the large numbers of available NATO strike aircraft. The third approach was to dedicate aircraft to orbit locations in and around the Kosovo Engagement Zone (KEZ). These missions typically employed fighters as forward air controllers using non-traditional ISR methods (eyeball, binoculars, on-board reconnaissance or infrared targeting pods) to search defined areas in order to attempt identification, assess collateral damage potential, and engage or report potential targets to other fighters and command and control agencies. Like the alert flex approach, the drawback to this methodology is inefficiency.[18]

One aspect of the flex targeting effort that had improved since ODS was ISR sensor to shooter timeliness. Despite the significant challenges and performance degradation from the hilly/mountainous terrain, two E-8 Joint Surveillance and Target Attack Radar System (JSTARS) aircraft were used somewhat successfully to direct airborne controllers and strike aircraft against potential targets of opportunity.[19] In the absence of formal processes and training, unique processes were developed to disseminate information from sensors to shooters. Examples included processing live Predator Unmanned Aerial Vehicle (UAV) images received in the CAOC into targets and passing them to orbiting strikers for prosecution. In another case, a U-2 detected a possible SA-6 which eventually was passed to an F-15E for engagement.[20]

Additionally, different services contributed towards information dominance by integrating non-traditional ISR assets to cover the gaps. In particular, the Navy's use of the Tactical Air Reconnaissance Pod System (TARPS) on its F-14s and Advanced Aerial Reconnaissance System (ATARS) on the F/A-18D contributed to detecting, identifying, targeting, and assessing emerging Serbian targets.[21] Although the OAF flex targeting process improved as the operation progressed, the lack of results speaks for itself. Over 30,000 total combat sorties were flown during OAF, and although thousands of sorties were tasked to find and kill Serbian military forces in and around the KEZ, numerous BDA teams and studies reported that successful destruction of Serb military equipment was marginal at best.[22]

Problems. The lack of joint and service TST doctrine, processes, training, and hardware negatively impacted OAF operations. The absence of training focused on the prosecution of emerging targets at both the operational and tactical levels resulted in the requirement for centralized control and engagement authority that frequently resided with the JFACC himself, and many times at the Combined Force Commander (CFC) or senior political leader levels. The requirement to consistently communicate with the CAOC quickly highlighted the lack of required communication bandwidth between the CAOC and other tactical-level command and control elements. Centralized control exacerbated the communication limitations, and also highlighted the benefits of emerging datalink capabilities between sensors, command and control, and shooters. The lack of doctrine and process at the operational level translated into

inadequate (almost non-existent) JFC and JFACC guidance on what was a legitimate flex target and how it should be prioritized against the rest of the targets prosecuted in the ATO. The lack of guidance resulted in some sorties being diverted from targets with higher priorities than the flex target.[23]

It is also worth mentioning the impact that casualty avoidance and collateral damage had on the flex targeting efforts, since both factors shape the targeting process and its execution effectiveness. Acknowledging the negative impact NATO aircrew losses would have on public and coalition support for the air war, the JFACC Lt Gen Mike Short initially put a 15,000' minimum altitude restriction on aircrew in order to avert the potential of successful Serb SAM or AAA engagements. While the restriction was eventually relaxed to allow certain operations below that altitude, emphasis on avoiding friendly casualties shaped the OAF special instructions (SPINS). Although two friendly fighter aircraft were shot down by Serb air defenses, NATO did not lose any airmen to hostile combat engagements. General John Jumper, then Commander of USAFE (COMUSAFE), commented that "we set the bar fairly high when we fly more than 30,000 combat sorties and we don't lose one pilot. It makes it look as if air power is indeed risk free…."[24] Collateral damage concerns also contributed to the requirement for centralized control of flex targeting engagements. These concerns and restrictions increased after the widely publicized mistaken bombing of the Chinese embassy, and the unintended destruction of a civilian passenger train crossing a legitimate bridge target. To reinforce the point General Jumper made previously, Ben Lambeth in *The Transformation of American Air Power* notes:

> "The extraordinary media attention given to these events attested to what can happen when zero noncombatant casualties becomes not only the goal of strategy but also the expectation."[25]

TST Focus. In contrast to the aftermath of DESERT STORM, the problems and gaps identified during the prosecution of flex targeting in ALLIED FORCE got the attention of senior military leaders. The USAF was an integral part of a joint effort to develop and improve TST doctrine, processes and capabilities. General Jumper, first as COMUSAFE, COMACC, and then CSAF championed the effort to formally transform the AOC into a weapons system with associated manning, training, and hardware requirements. Immediately after OAF there was increased focus and support for improving command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities and architecture as well as system-wide datalink capabilities with the AOC as the hub of the system (See Figure 1). More importantly perhaps, there was a push to formalize TST into joint and service doctrine, as well as to develop service TTPs.
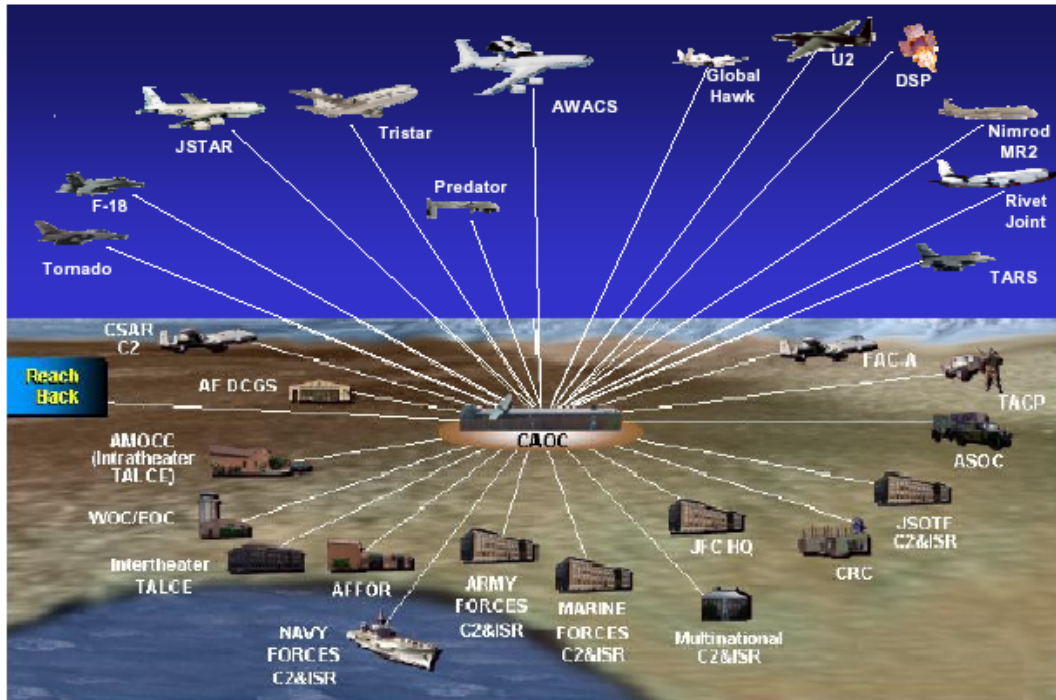
Figure 1. AOC as the Hub[26]

The Air Force initially focused efforts towards streamlining the process of F2T2EA, that is: Find, Fix, Track, Target, Engage, and Assess (Figure 2). The key pieces for development surrounded fusing current and developing ISR sources to quickly and efficiently enable the first three steps (F2T) while ensuring the ability to accurately assess effects. Initial concerns that airborne reroling would lead to aircrew task saturation focused some Air Force C2 Battlelab attention on shortening the traditional ATO targeting cycle, while other efforts quickly focused on using link technologies to more efficiently pass updated taskings.[27] The increased emphasis on datalink technologies to enable a more efficient process for the "T2E" portion of the engagement model focused on Link 16 and the Joint Tactical Information Distribution System (JTIDS). At the same time, Air Combat Command began development of a Time Critical Targeting (TCT) function for the AOC, with the goal that the AOC would provide air component targeting processes and solutions to applicable joint TCT requests.[28]
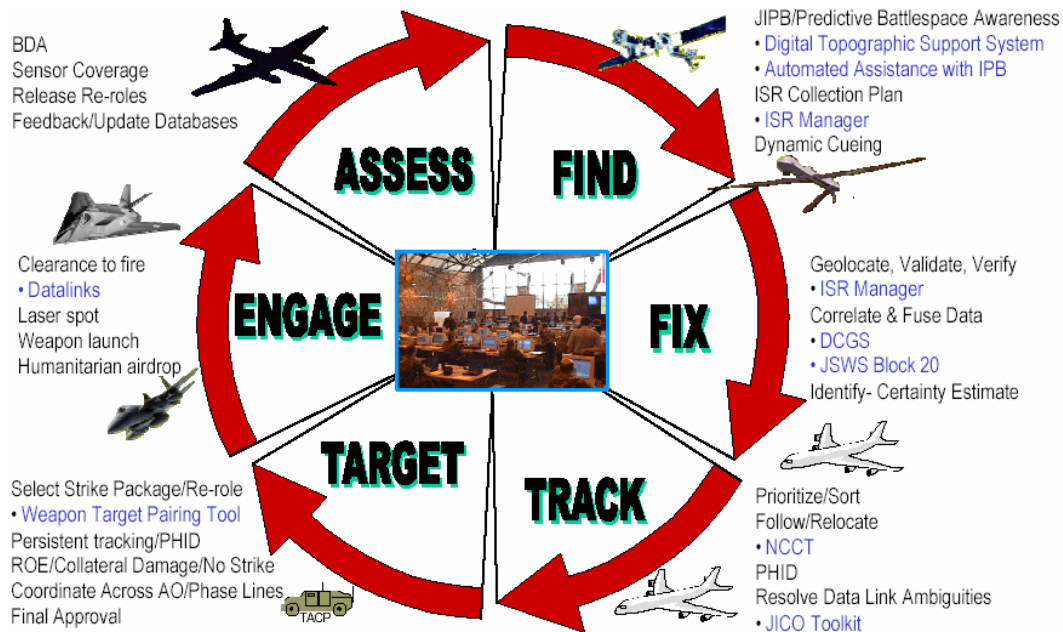
Figure 2. F2T2EA Process Diagram[29]

During this timeframe, services as well as combatant commanders focused on the TST process. The 2001 version of Joint Pub 3-60 *Joint Doctrine for Targeting* defined TSTs as

> "air-land- or sea-based targets of such high priority to the friendly force that the JFC designates them as requiring immediate response because they pose (or will pose) a danger to friendly forces or because they are highly lucrative, fleeting targets of opportunity."[30]

The USAF included an additional reference to TCTs, a subset of TSTs with even shorter engagement windows. Even though there was no TCT reference in joint doctrine, the term worked its way into joint lexicon and added confusion. Eventually the USAF regarded TCT as a process, while TSTs became one subset of targets handled within that process.[31]

Meanwhile the Army, identifying the need to automate the targeting process under the umbrella of Theater Missile Defense initiatives, energized their battle labs to support Advanced Concept Technology Demonstrations (ACTDs) to help automate the targeting process. One of the first ACTDs explored for Army TST use was the Automated Deep Operations Coordination System (ADOCS). Their focus and support of ADOCS would prove later to be a key milestone in automating the TST process for the AOC.[32]

Operation ENDURING FREEDOM

Although there was significant movement towards improving the TST shortfalls identified during OAF, when ENDURING FREEDOM began in October of 2001 most of the joint and service doctrine and TTPs updating time-sensitive-targeting were still in draft form. More

importantly, at both the operational and tactical levels the processes and procedures were still widely unknown by those about to execute what many considered a conflict against mostly emerging targets.

Because of the widely dispersed nature of the Taliban and elements of al Qaida, the air war in Afghanistan was largely fought with Special Operations Forces supporting the air component effort to detect and identify enemy emerging targets. Because of the lack of "traditional" preplanned ATO targets (e.g., infrastructure, integrated air defenses, command and control), the preponderance of air tasking in OEF went towards interdicting enemy forces or logistics discovered real-time by ISR or SOF forces. In the AOC, all of the real-time targeting including close air support (CAS) requests were handled by a 5-person TST cell on the operations floor. The majority of aircraft received their tasking while airborne over the battlespace. From the Navy perspective within the 8th Carrier Air Wing flying missions over Afghanistan, "at least 80% of the aircrews dispatched on strike missions did not know what targets they would hit, if any, when they left the carrier." The term "time-sensitive strike" became the all-encompassing catch phrase for those missions tasked real-time. In effect, the term became synonymous with a targets that had to be struck "…today rather than tomorrow."[33]

The lack of preplanned ATO targets meant the burden of targeting would fall largely upon the shoulders of the operations divisions of both CENTCOM and the CENTAF AOC. Like OAF before it, there was considerable concern over and direction given to mitigate collateral damage concern. General Franks reiterated the importance of low collateral damage as a "fundamental factor" to the eventual success of the campaign.[34] The relatively short notice prior to the beginning of combat operations and the concern over collateral damage resulted in a highly centralized TST decision-making process similar to what occurred in OAF. Complicating matters further, single authoritative TST process doctrine did not exist. A USAF TST Concept of Operations and JP 3-60 were both in draft form and not approved. Although some of the personnel who would work TST at CENTAF and CENTCOM were familiar with the drafts, significant friction occurred over process evolution versus process execution. The centralized control over TST execution coupled with a TST process that was still in its infancy contributed to the friction of efficiently directing combat operations at the operational level.

Centralized control of TST in OEF was inefficient in that both CENTCOM and CENTAF had redundant, parallel TST processes as opposed to an integrated, synchronized approach. The two organizations used different methodologies in the areas of Desired Mean Point of Impact (DMPI) selection, Collateral Damage Estimation (CDE), weapons target pairing, and using the Common Operating Picture (COP). In the first three areas, CENTCOM tended to use more conservative methods and estimates while CENTAF tended to use generally accepted, albeit more liberal ones. The differing solutions generated by the two organizations initially created trust issues between them, which resulted in double-checking each other's work and increasing the execution timeline.[35] Within these two processes there were also two differing philosophies on time-sensitive targets.

> "CENTCOM and CENTAF pursued two distinctly different objectives with differences in emphasis, what a senior analyst defined as a '***TIME***' Sensitive Targeting versus Time ***SENSITIVE*** Targeting problem… At CENTCOM, time in the TST process was subordinate to sensitivity. Unless a target could be defined

as highly threatening, time was not the overriding consideration. Collateral damage considerations and coalition sensitivities dominated as the primary emphasis."[36]

Final approval for most TST nominations was also centralized at the senior levels of CENTAF and/or CENTCOM, and in the case of some leadership targets were reserved for the Secretary of Defense himself. This dogmatic approach reflected the importance of avoiding collateral damage, and targeting timelines were increased due to no specific CFC-defined TST target categories and no established criteria permitting decentralized execution.[37] An Air Combat Command process study of TST during OEF documented another interesting factor that influenced the F2T2EA timeline;

> "On the one end were the purists or the idealists, who look at TST from the perspective of Major Theater War (MTW), a large scale land-air war at the operational level. On the other side were the hybridists. They looked at TST from a very strict and limited low intensity conflict (LIC) perspective, controlled at a very high level of government, akin to what happened in Afghanistan. The MTW or purist approach holds that the attitude toward CD, critical political realities, and humanitarian interaction factors should not be considered in TST processes in major theater war. This group believes in making risk weighted decisions. The hybridists on the other hand are risk averse. They are extremely sensitive to CD, national infrastructure, and deconfliction issues."[38]

It is interesting to note that personality interactions had such an impact on operational decision-making. Personal interactions and the purist/hybridist friction would also influence operational execution later in OIF.

Besides the previous observations, the ACC report concluded that 1) the complex, redundant decision-making processes consumed a greater proportion of the F2T2EA timeline than the communications between the other process components, and 2) the process execution was situationally dependent upon the different personalities and interactions in the two organizations. The recommendations of the ACC study were to:

1. Revise existing Joint and USAF TST doctrine, TTPs, and training to focus on more standardized, integrated, and efficient kill chain processes.
2. Revise the existing Joint definition of Time-Sensitive Target.
3. Develop meaningful metrics to assess the performance of TST processes.
4. Study the relationship between TST and TST technology improvements including the effects on control and execution.[39]

The first five months of ENDURING FREEDOM saw the true birth of the joint TST process implemented during Afghanistan combat operations. Although even those who were a part of the process would freely admit it was an "ugly baby," the lessons and recommendations that followed resulted in swift action filling joint doctrine and process gaps in preparation for OIF.

Chapter 3

Time-Sensitive Targeting in Operation IRAQI FREEDOM

"The campaign also showed that coalition aircraft needed to be able to identify and target mobile, camouflaged and underground assets and facilities and to achieve discrimination in urban areas. This requires improvements in data transfer, tactical reconnaissance and high definition imagery systems to deliver shorter sensor to shooter times for time-sensitive and 'find and destroy' missions."

UK Ministry of Defence
Operations in Iraq: First Reflections[40]

The potential benefits of an efficient and Joint F2T2EA process were realized during OIF. This chapter will focus on the significant improvements that occurred after OEF leading up to Gulf War II by using the ACC OEF recommendations as a measuring stick. The remainder of this chapter will describe how emerging targets including TSTs were specifically defined within the context of the operation, the actual quantifiable results of TST prosecution during IRAQI FREEDOM, and some observations on TST process execution.

Post OEF Improvements

Joint TST Definition and Doctrine. There was some confusion during OEF as to the scope of the "highly lucrative fleeting targets of opportunity" portion of the joint TST definition. Without adequate commander's guidance a liberal interpretation of that phrase could easily result in a misprioritization of effort. As a result of that confusion, the 17 January 2002 version of JP 3-60 *Joint Doctrine for Targeting* included more emphasis on the JFC's objectives and guidance relating to TSTs. Although the TST definition itself remained the same, the emphasis on JFC prioritization is clear:

> "The JFC's objectives and guidance set the basic procedural framework for the components to expedite targeting TSTs. The JFC specifically prioritizes TSTs for immediate response. Additionally, the JFC establishes guidance on procedures for coordination, deconfliction, and synchronizations among components in a theater and/or JOA. Once this guidance is set forth, the components establish planned and reactive procedures for attacking the prioritized TSTs."[41]

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JP 3-60 also broke down the TST categories into Planned and Immediate. Planned targets were defined as those known to exist and either scheduled for fires or on-call for fire allocation depending on emerging situations and campaign objectives. Immediate targets were defined as those identified too late, or not selected for action in time to be included in the normal targeting process, and therefore have not been scheduled.
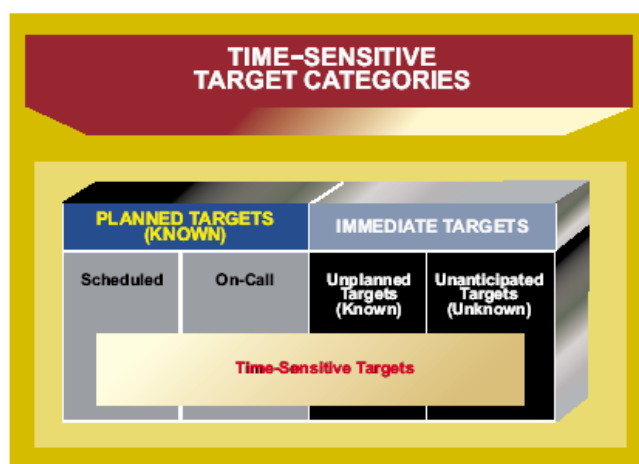

Figure 3. Target Categories[42]

Unplanned immediate targets are those "known to exist in an operational area but are not detected, located, or selected for action in sufficient time to be included in the normal targeting process." Unanticipated immediate targets are those "that are unknown or not expected to exist in an operational area."[43] Although these definitions helped academically classify the different target types, they did not end up becoming a part of TST execution lexicon. Besides time-sensitive targets, JP 3-60 defined two other high priority target types:

> High-payoff Target (HPT): A target whose loss to the enemy will significantly contribute to the success of the friendly course of action. HPTs are those high-value targets that must be acquired and successfully attacked for the success of the friendly commander's mission.

> High-value Target (HVT): A target the enemy commander requires for the successful completion of the mission. The loss of HVTs would be expected to seriously degrade important enemy functions through the friendly commander's area of interest.[44]

Although somewhat cosmetic, the above adjustments to doctrine and definitions placed important emphasis and discipline onto the JFC time-sensitive target definition process. In parallel with the effort to tighten joint doctrine and definitions, there was a significant operational level effort to improve the dynamic targeting process.

TTPs, Technology, and Training. As a result of codifying the lessons of the Afghanistan war, there were significant advances in the development of Joint and service doctrine, processes, and training. Joint Forces Command (JFCOM) published the *Commander's Handbook for Joint*

Time-Sensitive Targeting as a resource tool for the joint community. The handbook pulled together various Joint and service doctrine and although not authoritative, is an excellent supplement to the various other publications. The JFCOM publication strongly addresses the lessons from OEF, specifically citing the importance of clear, unambiguous TST definitions and priority guidance from the Joint Force Commander (JFC), as well as decentralized engagement authority to allow timely engagement.[45]

A combined USN-USAF focus on TST that began in 2000 resulted in completion of service TTPs and development of an aggressive experimentation roadmap. Both services had approved TTPs in-place before OIF that were developed over a two-year period of exercise and experimentation in various battle labs and live-fire exercises. The Air Force version, AFOTTP 2-3.2 included a detailed attachment on the TST process. The service and joint process refinement began in earnest at Joint Expeditionary Force Experiment (JEFX) 00, when the USAF focused on reducing the F2T2EA timeline, quantified the increase in success rates using datalink, and identified new automated ISR management tools and capabilities. More importantly, at the end of JEFX-00 a year-round TST experimentation and exercise process was stood up at Nellis AFB, NV.[46]

The next major training event to occur was the combined JFCOM-sponsored Millennium Challenge 2002 (MC 2002) and USAF JEFX-02, which further refined TST processes and incorporated several new ACTDs that integrated and automated those processes. The experiment focused TST on a handful of critical capabilities towards improving F2T2EA, one of which was to employ data links enabling rapid TST operations. The focus on datalink reinforced a finding from JEFX-00 that the process was significantly faster and more accurate with the use of datalink versus without, and paralleled a renewed procurement focus on equipping critical delivery platforms and command and control nodes with compatible link systems.[47]

Two other MC 2002 TST critical capabilities were 1) to develop rapid, high-fidelity targeting info for TST engagements and 2) to provide rapid weapon target pairing based on commander's guidance, ROE, target priority, attrition analysis and probability of kill. Both of these capabilities were supported at MC 2002 with the incorporation of ADOCS as a TST process tool.[48] ADOCS is a PC-based application that pulled information from various systems and databases into a user-friendly windows-like display format. It provided a tailorable-display common operating picture (COP) of friendly and enemy force locations based upon data from the Global Command-and-Control System (GCCS), and alleviated the need to run other stand-alone COP applications. ADOCS also provided a bridge to other service systems, including the Theater Battle Management System (TBMCS) for air tasking order and/or air space control order information, the Joint Targeting Toolkit for restricted target and no-strike target list information, and the Army's Advance Field Artillery Tactical Data System (AFATDS).[49]

ADOCS also included a Joint Time Sensitive Targeting Manager (JTSTM), which would prove itself during MC and later in OIF as critical to providing joint visibility and efficiency in the TST process. The JTSTM quickly provided the JFC and components the transparency required to avoid the duplication of effort and the second-guessing common during OEF, and facilitated joint collaboration and synergy.[50] At the component level, the Intra-AOC Target Manager (ITM) allowed the AOC TCT cell to execute a parallel process that not only shortened the F2T2EA timeline but increased the capability to process multiple TSTs simultaneously.

In parallel with the development of the TST process preceding the war, there was also a significant effort to strategize the counter-Scud effort. In the spring of 2002 General Moseley asked Air Combat Command (ACC) to create a Joint Counter-Scud working group to tackle the Counter Tactical Ballistic Missile (CTBM) mission strategy and execution planning. The working group developed a concept of operations after completing a detailed intelligence assessment that defined the scope of likely Iraqi ballistic missile launch areas. To test the process and help refine ROE, PID, and CDE three live-fire exercises were conducted integrating Special Forces on the ground with air component ISR, attack assets, and operational-level command and control. During the second exercise the CTBM effort was merged into the TST process development and execution. As a result of these important dry runs, CENTAF and TST leadership tirelessly worked with legal personnel to craft, tweak, and finalize ROE and CDE that enabled decentralized TST execution.[51]

An important aspect of the advances in TST prosecution during 2001-2002 was that experimentation, OEF wartime experiences and exercises built a cadre of professionals who were quickly becoming the joint and service TST experts. Many of the same personnel who participated in the JEFX's and other live-fly exercises had OEF time-sensitive targeting experience. These same individuals would form the foundation of the respective TST cells at both the CENTCOM and component levels during OIF. From the Air Force perspective, one of the shortcomings of the JEFX's was that only a token representation of the rest of the AOC combat operations personnel participated. As a result, some process seams between the TCT cell and the rest of the AOC Offensive Operations team were not identified until the process was exercised with the majority of the AOC during Exercise INTERNAL LOOK 02 in December 2002, and many of those issues would not be satisfactorily identified and addressed until the entire CAOC came together in the month prior to OIF. Nevertheless, the joint and service focus upon TST after ENDURING FREEDOM enabled the successful execution of time-sensitive targeting during major combat operations in IRAQI FREEDOM.

Background

The US-led coalition during OIF had no doubts that Iraqi leadership and military would use the tactics that had proved most effective against US forces over the last decade. The strategic level chaos resulting from Iraqi Scud launches directed at Israel during the first Gulf War made the suppression of Scud launches from western Iraq the most important US military objective. Another US concern was quickly gaining air superiority around Baghdad. The large concentration of tactical and strategic surface-to-air missile systems in and around the capital, Kirkuk and Tikrit meant that, because the Iraqis used concealment and movement to increase SAM survivability, the sites would have to be attacked very quickly after they were discovered and identified.

OIF Force Organization

From the air component perspective, Iraq was divided into three sectors for the execution of OIF: North, South, and West (see Figure 4).

Figure 4. TST Sectors[52]

The primary mission in the western sector was a counter-Scud operation, and was executed with coalition air forces flying out of various locations in the area of responsibility (AOR). The air component was supported on the ground by special operations teams scattered throughout western Iraq who were providing reconnaissance and surveillance of probable Scud hide and launch locations. A preponderance of the missions fragged in the western sector were designated XATK, with the "X" delineating that the mission was allocated to western counter-Scud operations. These sorties were tasked by the CAOC TST cell primarily to the prosecution of western TSTs, but also to other "immediate" targets across Iraq.

The air forces earmarked for operations in the North were originally planned to come from US carriers in the Mediterranean Sea combined with attack and support aircraft flying out of Incirlik AB in Turkey. Missions in the north were to achieve air superiority, provide SEAD support, and support the Army and special operations forces by providing air interdiction and close air support among others. Turkey created a significant challenge for the coalition by not approving US operations out of Turkey.

Besides denying the land component commander the second front desired in the initial OIF plan, the lack of Turkish access denied the air component use of the majority of the coalition air forces that had been positioned to support the operation in the north, including critical SEAD, tanker, and strike aircraft. The effect on the overall campaign would be increased risk; intermittent fighter counter-air coverage, lack of command and control communications, and the lack of SEAD protection along with gaps of on-call CAS assets would significantly complicate the northern air campaign.

Assets supporting the southern sector air operations came from the numerous coalition bases in the AOR, Naval and Marine assets in the Persian Gulf, as well as some long-range bomber missions originating in the United Kingdom and elsewhere. The missions of the air component in the southern sector covered the entire gamut of doctrine: counter-air and SEAD missions to establish air superiority, strategic attack against leadership and regime command and control capabilities, air/killbox interdiction to shape the battlespace, and close air support of land component and special operations forces pushing toward Baghdad. Until Turkey allowed overflight of Turkish airspace by navy missions originating in the Mediterranean, some missions fragged in the ATO for operations in the southern sector were retasked airborne to conduct strikes in the north.

CENTCOM Target Definitions

One of the key TST lessons from previous conflicts was the importance of the JFC defining and prioritizing the different target categories, including TSTs. In OIF, the following descriptions of target types were used:[53]

Time Sensitive Target (TST) – A target identified within the ATO cycle of such importance to the CFC that it must be struck as soon as possible with any asset. *In OIF, CENTCOM determined that the TST target sets were Iraqi military leadership and non-military regime command and control, weapons of mass destruction delivery systems/equipment, terrorists and their facilities, and mobile WMD labs.*[54]

Dynamic Target (DT) – A target identified within the ATO cycle of significant importance to all components that is should be struck during the ATO period given available assets. *In OIF, the Chief of Guidance, Apportionment, and Targeting (CGAT) determined which target sets were DTs. Examples included long range radars, air defense components, AAA pieces, and SAM systems.*

Joint Critical Target (JCT) – A target identified within the ATO cycle that does not meet TST or DT criteria, but is important enough to introduce for strike during the ATO in execution. *During OIF, CENTCOM J3 had to approve JCTs for inclusion into daily execution. Examples included elements of command, control, and communications.*

Emerging Target (ET) – A target that meets sufficient criteria to be considered and developed as a target. The criticality and time sensitivity of this potential target is initially undetermined. Based upon the subsequent target development, if the target requires prosecution during the current ATO execution, it will be promoted and prosecuted as a dynamic target. If the time sensitivity is not critical, the target will be developed and

prosecuted via the planned targeting process. *Examples of ETs in OIF included mobile tactical SAMS, mobile artillery, and massed enemy ground forces.*

Rerole (RR) – Assigning a mission a higher priority target, a replacement target, or an additional/different mission tasking than ATO-assigned. Occurs within the ATO cycle. *Examples from OIF included reroling a mission to a higher-priority DT or JCT, reroling a mission whose assigned target was destroyed or no longer valid, and reroling a bomber to strike additional target(s) after completing primary mission/tasking.*

Of all of the target categories above, only CENTCOM-defined TSTs had a higher priority than every other ATO assigned target. The other targets, including DTs, JCTs, ETs, and both HVTs and HPTs were vetted for priority before a mission was reroled off of its ATO-fragged target. In practice, the large majority of the immediate targets during OIF were serviced with either unused or unallocated ordnance, or by aircraft whose primary ATO-assigned target had either been destroyed, overrun by friendly ground-positions or airspace control measures, or placed on the CENTCOM no-strike list (NSL) pending assessment from an earlier strike attempt.

OIF TST Execution Results

There was even greater emphasis in OIF than in previous conflicts on avoiding collateral damage in order to both preserve key Iraqi infrastructure as well as minimize negative impacts on international support for the war. To this end, detailed positive identification (PID) criteria and collateral damage estimate (CDE) measures were developed at both the operational and tactical levels. At the operational level, execution of immediate targets did not proceed until both PID and CDE criteria had been met. Because of the increased emphasis on discriminating effects, precision-guided munitions became the preferred weapon against TST and other emerging targets. During OIF, approximately 68% of the total munitions expended were guided, and of those guided munitions over 85% were PGMs including traditional laser-guided bombs as well as GPS-guided/aided weapons. More importantly, the majority of immediate targets prosecuted by CENTAF TST Cell were serviced by PGMs.[55]

The decentralized TST engagement decision authority in OIF proved a sharp contrast to the centralization and associated problems cited during the Afghanistan war. Specific guidance was published dictating the approval level for the specific TST target categories previously described. A notional TST approval matrix example is provided in Figure 5. Aside from these specific approval instructions, the engagement decision authority for all of the other immediate targets sets was normally decentralized to the components.

CFC Priority	TST Target Type	Desired Effect	Approval Authority	Additional Restrictions[1]	Acceptable Risk Level	Other Requirements or Notes
1	Critical Weapon System A	Prevent Launch	On-scene Commander[2]	—	HI[3]	Strike immediately with any asset
2	Personnel or Groups meeting X criteria	Isolate, Capture or Kill	CFC or above		HI	Notify CFC Immediately & maintain senor track
3	Critical Weapon System B	Prevent Movement or Use	CFC		MED	Plume Analysis Required
4	Critical Weapon System C	Neutralize for Campaign Duration	Component[1]	—	LOW	—

l. LOAC, ROE & CDM procedures apply to all targets.
2. Refer to Component Level Guidance for further details.
3. CFC will except increased risk of fratricide and consistent damage.
4. Component Commander may designate and lower commands as needed.

Figure 5. Notional CFC TST Decision Matrix[56]

In the case of the CAOC, engagement authority was normally delegated to the Combat Operations floor leadership. In most cases, the F2T2EA process was worked by the TST Cell uninhibited all the way up to the "engagement" phase, at which point the Director of Combat Operations (DCO) made the execution decision.

CAOC-PSAB TST Cell Organization. The TST Cell members in the CAOC at Prince Sultan Air Base were handpicked because of their expertise in the CENTCOM AOR as strategists, planners, weapons and intelligence officers. Many of the cell members had been together throughout the JEFX and live-fire exercises, and the cell chief had actually run the process during OEF. In contrast to the small 4-5 person TST cell during OEF, the 25-member cell was organized into sections based upon the three Iraqi sectors, allowing a modular design that in the future could be increased or decreased based upon the size and scope of combat operations. Within each sector were teams of both intelligence personnel and rated operators working the F2T2, as well as special operations liaisons (SOLE) working friendly deconfliction issues. Additionally, the TST Cell had its own communication capability with a direct HF link to C2 platforms in the west sector, as well as datalink interfaces (surface track coordinator and RPTS operator) to pass target information and tasking directly to aircraft. The overall cell organization was flat with each team working multiple targets in parallel, while the cell chief provided guidance and prioritized overall effort and resources.
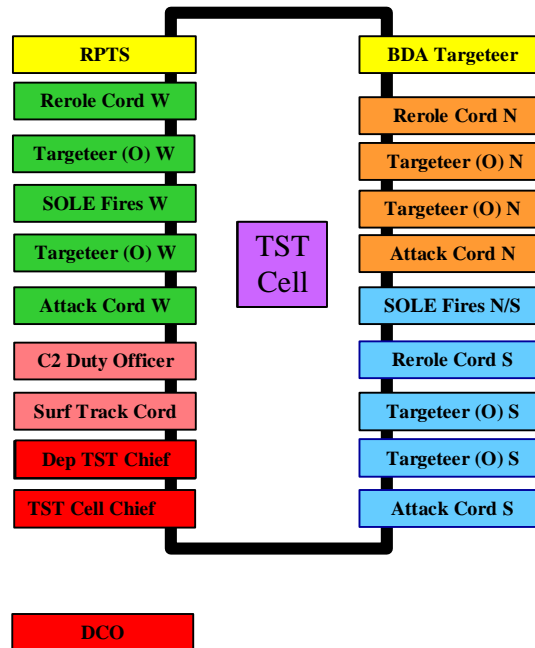
Figure 6. CAOC TST Cell[57]

ISR Effort. A critical component of the F2T2EA process was the ability of US and coalition ISR assets to find and fix immediate Iraqi targets. Eighty US and Coalition ISR platforms, flying approximately 1000 sorties, supported the effort while space-based assets provided operational and tactical-level support that included Iraqi missile launch detection. The ISR aircraft included RC-135 Rivet Joint, U-2, P-3 Orion, E-3 Sentry AWACS, E-2 Hawkeye AEW, E-8 JSTARS, MR-2 and R-1 Nimrod, PR-9 Canberra aircraft, as well as numerous UAVs including the Global Hawk and Predator.[58] In addition, non-traditional ISR methods including the use of fighter targeting pods and the B-1 Moving Target Indicator contributed capability towards the huge demand for actionable intelligence as well as assessment.

Overall Results. During OIF the air component processed 1368 immediate target missions that included dynamic targets, unexecuted TSTs, and other missions entered into the Intra-AOC Target Manager (ITM).[59] The total number of missions involved over 3000 individual target aimpoints, of which approximately 2100 were actually tasked for execution. The total effort is further broken down by sector and target type in Figure 7 below.

It is notable that the majority of the real-time targeting effort was against the non-TST missions categories. Because of the processes, tools, training, and personnel expertise a preponderance of all immediate target planning was worked by the TST Cell as opposed to Offensive Operations Duty Officers (ODOs).

Missions	South	West	North	Total
TSTs	108	21	27	**156**
DTs*	243	271	172	**686**
Not Exec TST	170	70	66	**306**
ITM Coord	143	30	47	**220**
Total	664	392	312	**1368**

*Includes dynamic targets, close air support and
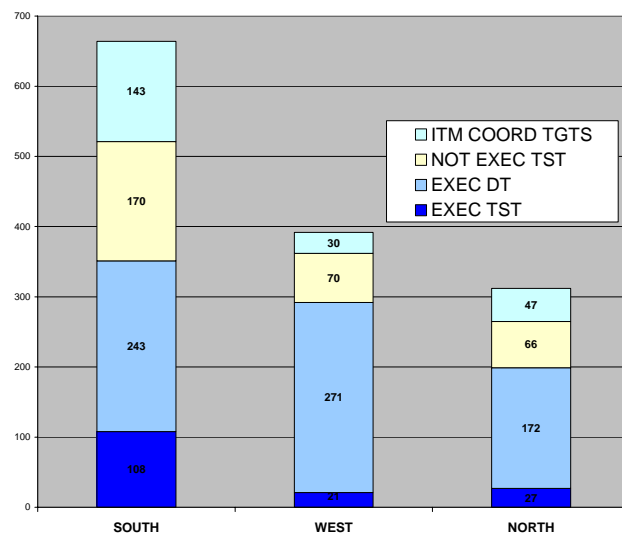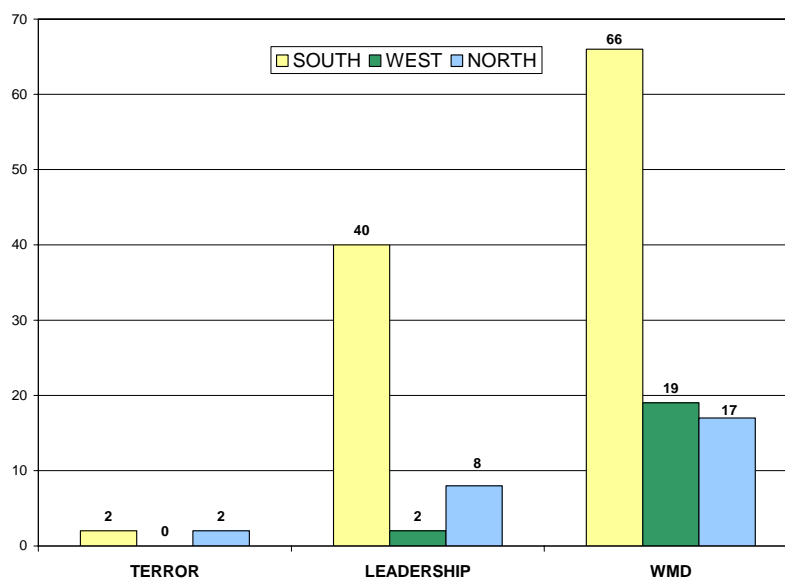GDI, ISR, reroles, and Joint Critical Targets.

Figure 7. Total TST Cell Missions[60]

The majority of action was in the southern sector which included Baghdad and the land component area of operations. The non-executed TST missions included those that were created based upon dated ISR, were aborted for various operational/tactical reasons, or were determined to be duplicate tasking from a previously accomplished ATO or immediate tasking. The missions listed as coordinated in the ITM included those passed on to other components, those serviced by TLAM, and those given a low execution priority.

TST execution highlights include the opening night TLAM and F-117 strikes against Iraqi leadership on 20 March, the F-16C attack on the home of General Ali al-Majid (Chemical Ali), and the B-1 attack on the meeting of Saddam Hussein and sons on 7 April, to name a few.

Figure 8 depicts the breakout by sector and target type of the 156 actual TST missions prosecuted by the CFACC, which accounted for 85% of the total theater-wide TSTs. Again, most TST missions occurred in the south where there was the preponderance of ISR assets and coverage focused against leadership targets and WMD delivery systems.[61]

Chart showing TSTs by Target Type with bars for SOUTH, WEST, NORTH across categories TERROR, LEADERSHIP, WMD:
- TERROR: SOUTH 2, WEST 0, NORTH 2
- LEADERSHIP: SOUTH 40, WEST 2, NORTH 8
- WMD: SOUTH 66, WEST 19, NORTH 17

*Rerole numbers are incomplete and only reflect reroles that were added to ITM towards the end of OIF. Offensive operations worked a significant number of reroles that were not captured in the above data.

Figure 8. TSTs by Target Type[62]

The majority of immediate targets worked by the CAOC were in the dynamic target category. The definitions of target types that fell into the DT category varied from day to day based upon CFC and CFACC guidance, but very quickly into the war Iraqi strategic and tactical SAM systems became the primary focus.

In order to achieve air superiority over Baghdad and enable the CFACC to provide urban CAS in support of the land component's capture of Baghdad, coalition efforts focused upon locating and destroying Iraqi capability to target coalition air forces. Figure 9 depicts the sector execution breakout of the various missions grouped under the total 686 dynamic targets executed in Figure 7. The CAS mission statistics mostly represent cases of which urgent requests for CAS were filled with forces reserved for other immediate targets. In the case of the west sector, the CAS requests to support SOF engagements were normally filled by western-tasked XATK missions. In the north sector, there was initially very intermittent air coverage available to provide on-call CAS support to Special Forces engaged north of Baghdad. As a result, the urgent requests were handled as immediate targets and initially bombers were reroled from XATK missions in the west to CAS in the north. Also, the rerole (RR) numbers in Figure 8 do not include a significant number of fighter/bomber missions that were not entered into the ADOCS ITM.*
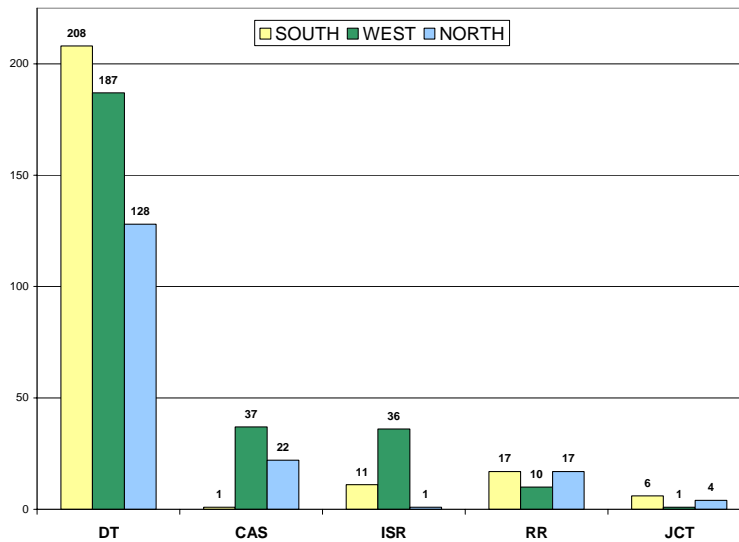
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Figure 9. Executed Dynamic Targets[63]

Figure 10 depicts the total distribution of executed dynamic and TST missions over the course of major combat operations. The steady increase in the number of DTs through the 12th day of combat operations reflects both a growing focus on destroying the Iraqi IADs and improving ISR efficiency and fusing of data which provided greater numbers of immediate targets for prosecution. The corresponding increasing numbers of northern missions correlates to an increased availability/scheduling of Navy strike assets for northern immediate target coverage.
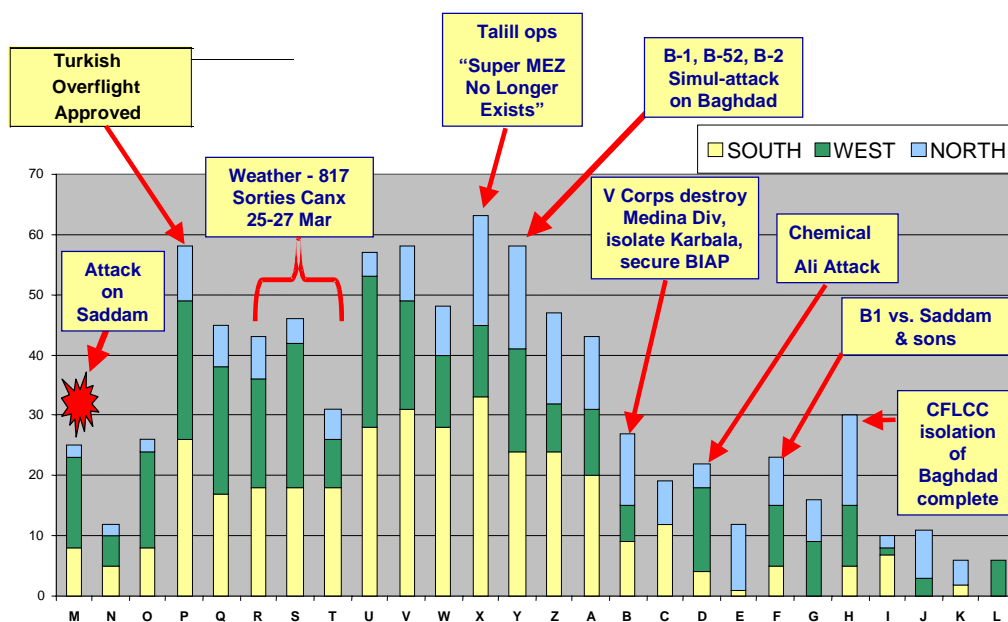

Figure 10. Executed Dynamic/TST Missions by ATO[64]

North Sector. At the beginning of the conflict, air operations in the north were significantly impeded by the lack of Turkish access and overflight. During the first week of the war many of the identified northern immediate targets went untargeted because of the lack of sufficient fighter and bomber coverage. The few missions that were executed often lacked adequate defensive counter-air (DCA) and/or SEAD support because of platform range and fuel issues. Those missions that were executed that first week were not timely, usually because of required unplanned pre-strike refueling and the associated time-delays for transit to and from tanker assets. As pointed out earlier, many of the dynamic target missions in the north were classic CAS missions filled by sorties reroled from other air interdiction (AI) targets. Figure 11 illustrates the type of ATO-fragged missions that executed the tabulated TSTs and DTs in the north. The Wild Weasel (WW) (executing SEAD) and the DCA mission contributions to immediate target prosecution were significant in that there was no appreciable adverse impact to the original ATO execution. The WW missions continued to carry out suppression duties while in many cases flexing to perform destructive DT attacks on portions of the IADS. Navy F-14s and F/A-18s fragged for DCA missions were also typically loaded out with PGMs, providing the CFC and CFACC with a multirole capability that executed 23% of the immediate target missions in the north. The majority of the rest of the northern tasking went to "X-type" missions which were ATO-fragged to service immediate targets.
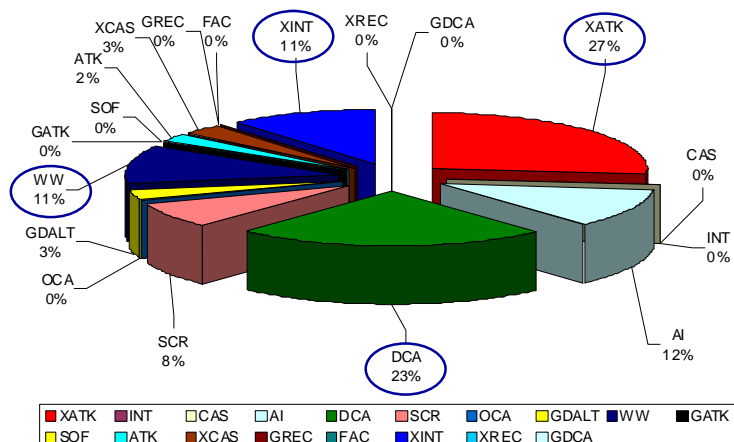

Figure 11. Northern ATO Mission Types[65]

West Sector. As mentioned previously in this chapter, the majority of air operations in the west involved dedicated "XATK" sorties specifically tasked with the counter-scud mission and available to prosecute immediate targets. As such, 97% of the TST and dynamic target missions serviced in the west were XATK missions fragged exactly for that purpose. The excess of available airpower in the west also resulted in some of the western XATK missions executing immediate target missions in both the southern and northern sectors. In many cases the specific asset used was the B-1; almost every ATO had continuous B-1 bomber coverage scheduled in the west. During Exercise INTERNAL LOOK 02 in preparation for OIF, the CAOC and TST cell identified the western B-1 as a lucrative "hip-pocket" option to service immediate target requests outside of the western sector. During OIF, the JDAM-loaded western B-1s became a primary workhorse for the TST cell and Combat Operations. On one OIF mission a B-1 flying

home after completing an ATO-scheduled bombing mission was directed to attack a leadership TST target in Iraq. After completing that tasking, the bomber coordinated with the TST cell to support Army ground forces under Republican Guard attack and proceeded to drop its remaining JDAM munitions upon the enemy forces.[66]

South Sector. The majority of immediate target taskings occurred in the south. The leverage gained from dual-roleing the WW/SEAD assets is illustrated in Figure 12. Wild Weasel sorties accounted for almost one-third of the immediate target prosecutions in the south, with another 18% covered by aircraft on ground alert in Kuwait and Qatar (GDALT and GATK) specifically tasked to respond to immediate target missions.

Without the sorties/weapons from the multi-role platforms, the CAOC would have had to consider pulling missions off of ATO–fragged fixed targets, negatively impacting the desired effects and objectives of that day's plan. In contrast to the contributions multirole DCA aircraft made in the north, only a very small percentage of DCA sorties executed immediate taskings in the south. Only after multirole F-15E aircraft loaded with PGMs were tasked for southern DCA was there any contribution from DCA-tasked aircraft in that sector.[67] The SEAD and DCA reroles helped minimize the impact to the ATO and had a very positive impact on OIF pace of success.

The use of the Global Hawk UAV to maintain persistent ISR coverage over the Baghdad "SuperMez" resulted in a dramatic increase in actionable dynamic target intelligence to the CAOC TST Cell at around day 8 (ATO T in Figure 9). Once source credits Global Hawk with locating "up to 50 surface-to-air missile (SAM) launchers, in excess of 10 SAM batteries, and approximately 70 missile transport vehicles."[68] Once the Global Hawk platform became integrated into the CFACC-prioritized DEAD campaign, the CAOC TST Cell successfully prosecuted a glut of SAM-related dynamic targets culminating with the effective takedown on the SuperMez by ATO X.

The Successes

Compared to the conflicts described earlier in Chapter 2, successful immediate target prosecution in OIF was strides beyond what had ever before been accomplished. US Secretary of Defense Donald Rumsfeld described the OIF success as an evolution towards "overmatching power" from "overwhelming force," emphasizing that the US military demonstrated massed effects without the historical massing of friendly forces. He describes speed, jointness, intelligence, and precision as the key enablers of this transformation:

- The importance of *speed*, and the ability to get inside the enemy's decision cycle and strike before he is able to mount a coherent defense;

- The importance of *jointness*, and the ability of US forces to fight, not as individual de-conflicted services, but as a truly joint force—maximizing the power and lethality they bring to bear;

- The importance of *intelligence*—and the ability to act on intelligence rapidly, in minutes, instead of days and even hours;

- And the importance of *precision*, and the ability to deliver devastating damage to enemy positions, while sparing civilian lives and the civilian infrastructure.[69]

The descriptions above relate directly to the successful prosecution of time-sensitive and other immediate targets during the second Gulf War. In fact, in his testimony to the Senate Armed Services Committee the SECDEF mentioned the first success of OIF was that "neighboring countries were not hit with Scud missiles."[70]

The integration of information technology tools like ADOCS into the CAOC and component headquarters permitted joint visibility into the targeting process, eliminating confusion, mistrust, and repetition while enabling the efficiency and speed required to successfully F2T2EA emerging targets in the battlespace. Both USAF and USA after action reports emphasize the contribution ADOCS made toward coordinating and prosecuting TSTs, visualizing the battlespace, managing engagement zones, deconflicting No-Strike and Restricted Target lists, merging targeting data, coordinating joint fires and streamlining command and control.[71] The melding of joint and coalition capabilities and platforms to maximize both ISR and target engagement results, exemplified by Global Hawk and various multi-mission DCA and WW/SEAD contributions cited previously, increased both the number of targets identified and the coalition's ability to attack them. Finally, the widespread precision engagement capability of the joint and coalition forces servicing immediate targets provided the overwhelming power without the mass.[72]

The combination of conventional bomber aircraft (B-1B and B-52) and GPS-aided weapons significantly increased the CFACC's capability to accurately attack large numbers of targets. The bombers typically carried upwards of 24 JDAM, usually of different fusing and bomb body types, which provided the CAOC with multiple options for prosecuting both TST/DTs or other emerging or previously missed targets. The large, accurate ordnance capability coupled with the ability to communicate with the bombers digitally over SATCOM was a huge force enabler during OIF. Although limited by bandwidth issues and occasional connectivity problems with aircraft, the primary means for passing the lists of targeting information to the bombers was via Combat Track II. Tasking one bomber loaded with JDAM provided a precision delivery capability that in the past would have required numerous fighters with correspondingly shorter on-station times. This bomber capability could have been further exploited with a more robust bandwidth/data link capability, including an interface into the primary targeting tool, ADOCS.[73]

There was a significant benefit of integrating coalition officers into key CAOC leadership positions. Royal Air Force (RAF) officers from the United Kingdom served as both CAOC Director and Director, Combat Operations Division. Partly due to the more restricted UK ROE and CDE requirements and also due to their more reserved, conservative personalities, the RAF officers tended to have a very positive dampening effect on the sometimes harried, chaotic pace of offensive operations. The contrast in the pace of operations from a US-led CAOC shift compared to a UK-led shift was very noticeable at times. For instance, the pace at which approved high CDE targets were prosecuted depended at times on the senior CAOC officer's nationality; US leaders tended to press ahead full bore, while their UK counterparts tended to methodically reconsider risk and cost-benefit tradeoffs before approving execution. While some might argue that the environment was similar to what occurred between the "purists" and

"hybridists" during OEF, during OIF this contrast proved complimentary and not adversarial. On numerous occasions the UK Director of Combat Operations prevented a fast-moving TST or offensive operations train from getting ahead of itself; the methodical, disciplined UK approach helped ensure there were no CAOC-directed friendly fire or significant enemy collateral damage incidents.

The Problems

The successes and achievements of immediate target prosecution during OIF far outnumber the negatives. Most of the problems uncovered during the prosecution of the air war were related to the still relatively young nature of the TST process coupled with MTW-sized combat operations and the historic number of immediate targets.

Organization. The CAOC Combat Operations Division structure adopted for OIF did not follow AOC doctrine and at times negatively impacted the operational effectiveness of offensive operations. During the experiments and exercises that refined the TST process, personnel traditionally assigned to support the entire offensive operations team were drawn into the TST cell. Since those exercises typically focused upon TST/counter-Scud operations, the impact to the rest of offensive operations of moving those personnel into the TST cell was not adequately addressed. By the time INTERNAL LOOK took place in December 2002, CENTAF planned to organize the TST cell as a team within combat operations, as opposed to the doctrinal organization as a cell within the Offensive Operations team.[74] As a result, the TST attack and re-role coordinators, targeteers, SOLE, JTIDs track data coordinator, and other datalink systems operators who would have to support all of offensive operations were organized within the TST Team, but outside of Offensive Operations. Key voice and datalink communications capabilities as well as critical personnel traditionally required to support all ATO execution replanning were focused upon only a small, albeit important aspect of the entire operation.

The targeting process and systems in the TST team enabled near real-time prosecution of a significant number of targets of strategic and operational importance during a given ATO day. Teamed attack coordinators and targeteers proved invaluable, and will undoubtedly be forced to deal with continuing joint emphasis on CD constraints, precise engagement, and deconfliction requirements in the future. The TST team used its processes, systems, and TTPs to prosecute TSTs and DTs while attempting to support Offensive Ops efforts to quickly develop emerging targets, reroles, and other immediate targets meeting CFACC guidance. The OIF organizational structure required the Senior Offensive Duty Officer (SODO) or other ODOs to request support from those in the TST Cell, who were the only personnel present capable of assisting the rest of offensive ops replanning. Similar to the problems between CENTCOM and CENTAF during OEF, during some CAOC shifts there was occasional friction between TST and Offensive Operations personnel that detracted from the overall offensive operation efficiency, and in some cases delayed or inhibited the floor's ability to prosecute non-TST missions.

A lack of link-capable aircraft coupled with limited access/bandwidth to link platforms resulted in an over-reliance on voice communications passed through Airborne Early Warning (AEW) platforms. Limited high-frequency (HF) voice links sometimes resulted in all C2, air-refueling, combat search and rescue (CSAR), and immediate target taskings for the north and south sectors funneling through a single HF frequency in the CAOC. The associated communication

logjam/backlog many times resulted in missed execution opportunities from an inability to pass required information and tasking to C2 and shooter platforms. There were many instances of aircraft, after refueling in anticipation of TST tasking, loitering for hours waiting for tasking that was never passed because of communication saturation.

Stovepiped Training. The large scale of OIF revealed some significant TST training issues at both the operational and tactical levels. Without a doubt the best-trained personnel on the CAOC operations floor were the TST Team. The core members of the cell had worked the counter-Scud and immediate targeting process together for over a year in various working groups and as a part of JEFX 02/Milennium Challenge and INTERNAL LOOK. By the time OIF began, they were very familiar with the process, procedures, and information tools to execute the F2T2EA process efficiently. In contrast, the rest of the Offensive Operations team had little or no interaction with the TST Team or the development of its process prior to OIF.

Although the entire operations floor conducted rock drills to exercise the TST process in the context of a simulated ATO execution, the size and scope of these exercises did not adequately identify the problems that would become obvious during full-scale combat operations, some of which are noted in the previous section. For example, because of the single HF link to AEW platforms, often times tasking never got passed to targeted platforms because of AEW workload and communication saturation. During scripted exercises this potential problem was hidden because of the serial nature of exercise scripts; events unfolded somewhat chronologically at the AOC and there was no real world communication saturation competing with AOC-initiated communications.

At the tactical level most aircrew were operating under ROE that were vastly more decentralized than what they had been acclimated to conducting air operations over Iraq during the preceding 12 years. The ROE for Operations NORTHERN WATCH (ONW) and SOUTHERN WATCH (OSW) had been very centralized; AOC permission was required for just about every potential offensive action. The IRAQI FREEDOM ROE, CDE, and PID time-sensitive targeting guidance was much more decentralized in nature. The significant amount of AEW-relayed aircrew requests to take specific actions that were clearly approved in the mentioned standing written guidance highlighted their discomfort or unfamiliarity with these ROE. While some aircrew did participate in the TST live-fly exercises during the counter-Scud evolution, for the majority of the joint and coalition forces the TST and immediate target execution during OIF was an unrehearsed pickup game.

IT Tools and Battle Damage Assessment (BDA). The F2T2EA process was hampered by a lack of accurate, timely tracking of BDA which continues to be an afterthought in the AOC. Even though the BDA process was heavily criticized after ODS, OAF, and OEF and predicted to be a problem still in OIF, effects-based assessment of what the air component has achieved is still incomplete and results in repetition and inefficient combat operations.[75] There was no automated IT process that incorporated mission effectiveness/BDA results into the daily execution of the ATO on the Combat Ops floor. The issue is beyond the scope of this paper, but involves numerous problems. One is that the United States' ability to destroy targets has overwhelmed the assets responsible for covering assessment. The CFC (as the collection manager) in many cases has to balance ISR assets against competing F2T and assessment requirements. A newer problem highlighted in OIF is that most J-series GPS weapons are launch

and leave, and unlike LGB and other PGMs do not provide the attacking aircrew any visual feedback of success that could contribute to the assessment process. Also, the BDA process has not made the full transition from assessing "destruction" to assessing desired "effects." For example, a JSOW or WCMD employed against a SAM radar would easily produce a functional kill without destroying the target, but because the radar still appeared in EO imagery it was assessed as only lightly damaged and requiring a re-strike. Another good example was the effect of penetrating munitions. Because of political sensitivities, high CDE targets were attacked using penetrating weapons with delayed fusing. Many times these targets, after post-strike imagery noted only small holes in the roofs of buildings and no other apparent exterior physical damage, were nominated for re-strike due to a lack of proper effects-based assessment. These problems led to multiple target sets being retargeted on different ATOs, leading to operational inefficiency.

The inability to quickly update the TBMCS database with all of the immediate target reroles and target additions compounded the BDA tracking problem. Although an outstanding application filling a basic C2 systems capability void, ADOCS pulled information from various databases but could not write back to them. A Joint Integrated Prioritized Target List (JIPTL)-tracking cell was created on the operations floor with the responsibility to maintain a spreadsheet tracking the execution progress of ATO targets as well as all of the added immediate targets in a given ATO day. In response to an OEF lesson, a dedicated BDA tracker in the TST cell produced a spreadsheet that included all of the ADOCS ITM and JTSTM targets. This spreadsheet was available electronically to the JIPTL trackers, who periodically pulled the data from the TST cell to include in their spreadsheet. The rest of the ODOs manually provided the JPITL trackers ATO progress and change inputs including reroles and emerging targets. The system was inefficient and very dependent on duty officer workload; there were many instances when the number of ongoing reroles and immediate targets kept Offensive Operations personnel from passing updates to the tracking cell. Although Offensive Ops personnel attempted to update mission taskings and targets directly into TBMCS, the large number of ATO changes quickly overwhelmed technicians responsible for inputting the data. Towards the end of the air campaign, for tracking purposes all of the immediate targets handled on the operations floor were entered into ADOCS.

Old Habits versus New Paradigms (Effects-Based Operations?). The air component targeting process focuses on achieving certain effects that enable specific military objectives. In the past, the effort at the tactical level and sometimes the operational level occasionally focused more on "doing something" than on what the added benefit of that something would be. There has always been a preoccupation in the fighter and somewhat in the bomber communities that coming home without any unexpended ordnance was a measure of success. This propensity is also somewhat present at the operational level as witnessed by AOC leadership in both OEF and OIF. In many instances the drive to maximize pairing of available ordnance to targets is beneficial and has resulted in many of the improvements in the "targeting-execution" portion of F2T2EA. The number of legitimate immediate targets along with available untasked munitions in OIF made this a valid objective, as expressed by a TST attack coordinator: "Our goal is to send our people home (from their combat missions) without any bombs under their wings."[76] However, it is easy for this focus to degrade from the means to achieving desired effect to the ends in and of itself.

There were more than a few cases during OIF when it appeared attacking any available target became the goal. At the operational level in the CAOC, the formal ATO target development

process followed effects based doctrine that emphasizes "there is not a target that is not specifically struck to achieve a desired effect."[77] In practice, there were times when the Combat Operations floor received direction that was contrary to an effects based end. For example, as land component forces closed on Baghdad there was significant senior-level concern about impending Iraqi employment of chemical or biological weapons. As a result, the CFACC directed the CAOC to deny the Iraqis the capability to deliver those weapons from the air. ATO missions were added to cut every Iraqi runway and taxiway to deny any takeoff or landing capability (Good). At the same time there was pressure to bomb buried, rotorless Iraqi helicopters that by intelligence accounts had been disabled for up to a year (Bad).[78] Effects-wise, since the Iraqis disabled their own helicopters and fighters, the coalition achieved the desired effect, but nonetheless significant effort and resources were expended across a 2-3 day time period to destroy disabled equipment.

Another example of a lack of effects-based targeting also occurred as coalition ground forces closed on Baghdad. As BDA began to slowly provide execution assessment, a number of fixed targets were identified that had not yet been struck, and were behind friendly lines. In many cases the targets were not hit as originally fragged because of their proximity to friendly forces. In a confusing execution spiral, Combat Operations was directed to attack a number of these targets, which required attack approval by the land component because the target location was behind the fire support coordination line (FSCL). Almost if not all of these attacks were denied by the land component because friendly troops were already at the target locations, yet the CAOC efforts to attack them continued for days.

At the tactical level operator unfamiliarity with the "desired effects" burdened the already stressed communication channels with the CAOC and degraded TST and DT execution. There were instances when aircrew, instead of maintaining station with their fragged controlling agency, went shopping for missions in order to ensure they expended their weapons prior to returning to base. In the case of the DEAD campaign in Baghdad, on multiple occasions the CAOC TST cell could not communicate with SEAD assets that should have been on station in and around the Baghdad MEZ but instead were hopping to different land component controlling agencies in search of targets. There is still some education to be done in the area of effects-based operations. At the operational level key Combat Operations personnel must be trained to question the desired effect (versus "bomb these targets") in order to appropriately prioritize

effort and resources. Additionally, the CAOC must clearly communicate intent and desired effects to executing units at the tactical level, and then hold those units accountable when and if occasional aircrew discipline problems arise.

Aside from these execution anomalies, the majority of operations at both operational and tactical levels were professionally executed by coalition forces adapting to a new combat environment. This was characterized by a robust ability to process and identify volumes of immediate targets, and a capability to quickly pair available assets to engage those targets. The time-sensitive targeting process in OIF finally demonstrated that with clear guidance, decentralized control, automated processes and software tools, and trained personnel the F2T2EA effort could achieve significant, measurable success.

Chapter 4

Future Trends and Challenges

"The capabilities of the US aerial attack forces for planning and making adaptive impacts are increasing even more with the implementation of the concept of 'dynamic planning,' which envisages the retargeting of aviation strike weaponry and cruise missiles after the issuance of the order to carry out a mission even when already in flight. The appropriate technical resources are being developed to make this happen. In light of this, the theory of the US art of war has marked a new form of military operations..."

Major-General G. A. Berezkin
Russian Ministry of Defense
Briefing to Russian Academy of Military Sciences Council, 6 June 2003[79]

The US joint military community is actively engaged in not only capturing the lessons of OIF but is wasting little time using them as leverage to improve joint capability and preparedness. This chapter will summarize the efforts and progress made on some of the execution shortcomings mentioned previously, as well as provide some impetus for improving joint and coalition training.

Lessons Learned Process

The effort to capture the lessons of OIF began well before the start of combat operations. At the joint operational level, Joint Forces Command took the lead responsibility for observing and collecting lessons learned. A 30-person team assembled and deployed forward to the CFC and component headquarters in early March 2003. These personnel observed operations first-hand and are "triangulating" specific component inputs into a formal classified report.[80] The initial quick-look at the major successes cited the TST process as a significant contribution to the campaign, and highlighted the major problems briefly mentioned in the previous chapter dealing with the BDA process. In parallel with the JFCOM process, each of the service components undertook aggressive efforts to capture and act on lessons dealing with the F2T2EA process and results. The remainder of this section will primarily focus on some of the air component lessons and CENTAF-led efforts to improve the immediate targeting process.

Fixing the Problems

The Air Force and other services did not waste any time turning OIF lessons into change and improvements. The fact that CAOC-PSAB was not only joint but consisted of personnel from a wide-cross section of service organizations helped speed the change; the CAOC duty officers returned to their home stations with first-hand knowledge and experience of what needed to be improved. A CFACC lessons learned conference was held at Nellis AFB, NV in July 2003 which brought together coalition and joint operators with operational and tactical backgrounds to develop recommendations specific to time-sensitive targeting and processing other immediate targets.

Organization. One of the recommendations from the CFACC conference was to return the TST cell back under the Offensive Operations team while stressing the importance of maintaining a flat, decentralized execution in order to streamline F2T2EA. The Chief of Combat Operations in the CAOC commented after the war that for unity of command, TST should be organized under Offensive Operations in order to avoid friction over competing priorities and resources.[81] The Air-Land-Sea Application Center (ALSA), tasked to consolidate multi-Service tactics, techniques, and procedures (MTTP) for planning, targeting, and prosecuting TSTs into a single document, incorporated the recommendation into AFTTP(I) 3.2-3 *TST: Multi-Service Procedures for Targeting Time-Sensitive Targets*, currently in final coordination.[82] This MTTP incorporates current TST TTPs, best practices, and key lessons from OAF, OEF, and OIF as well as experimentation and exercises. Figure 13 depicts the recommended organization and also depicts coordination lines between the different cells. This change should alleviate most of the unity of effort problems cited in the last chapter.
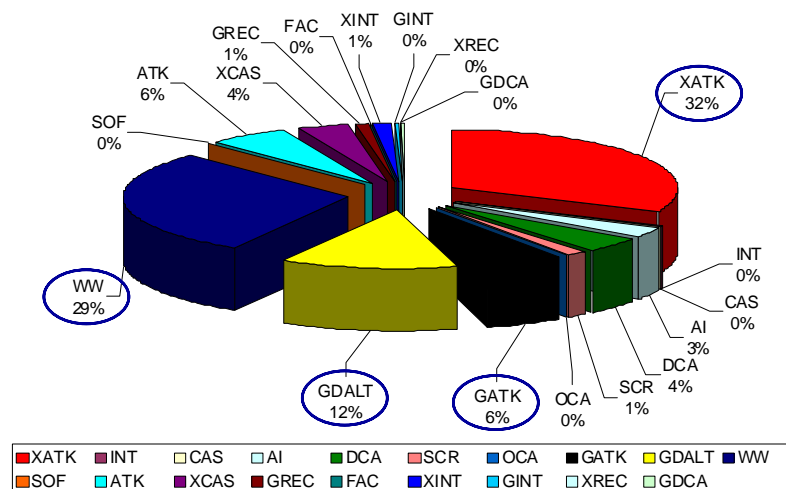

Figure 12. Southern ATO Mission Types[83]

Another key recommendation is renaming of the TST Cell to the Dynamic Targeting Cell (DTC). This change reflects the reality that the F2T2EA process in the cell applies to all immediate targets, not just those CFC-designated target categories. The process, tools, and

expertise in the TST cell in OIF were needed and used beyond just TSTs. The new AFOTTP 2-3.2 *Air and Space Operations* Center is in revision and incorporates many of the OIF lessons. The current draft describes the DTC as follows:

> "This team will consist of the expertise and tools to enable the CAOC to direct execution of Time Sensitive Targets, Dynamic Targets, Emerging Targets, Re-roles and Re-targets outside of pre-planned targeting within the ATO. One team using a standard set of process and tools enables efficient execution of multiple target types within the ATO cycle."[84]

Organizing all of the offensive operations targeting under one cell will maximize efficiency and avoid the duplication of effort and resource competition that sometimes occurred on the CAOC Ops floor during OIF. Pacific Command (PACOM) and its components have already successfully exercised using the draft MTTP and AFOTTP guidance during TERMINAL FURY, and USAFE is planning the same during AUSTERE CHALLENGE in April 2004.

ADOCS/IT Tools. The outstanding performance of ADOCS and the capability it provided the joint Warfighter during OIF reinforced the importance of a single, useful, integrated software application to streamline operational-level C2 and execution. ADOCS enabled rapid parallel coordination on every facet of targeting including target validation and PID, friendly deconfliction, CDE, strike asset pairing and strike approval. Shortly after OIF Decisive Operations concluded, JFCOM acknowledged the ADOCS baseline functionality as a joint requirement. Shortly thereafter, the joint requirements process formalized the ADOCS application capabilities as requirements for the WEB Enabled Execution Management Capability (WEEMC). WEEMC is the next evolution in C4 software and will improve integration of the numerous web-based applications. More importantly WEEMC will include the two-way data transfer that was lacking in the OIF-fielded version of ADOCS. These improvements will streamline and integrate immediate targeting and current ATO execution by linking different application databases, minimizing "manual" data transfer and latency. For instance, current mission status in TBMCS could be linked to the COP to provide automated, accurate, up-to-date status information.[85]

Another IT issue that was identified during the OIF TST process was that TBMCS did not permit the entry of specific ATO mission aircraft and configuration detail required for efficient, accurate targeting. Specifically, only one stores configuration loadout (SCL) field is present for each ATO mission number, with no field denoting munitions fuse settings. Because of CDE concerns described earlier, target and aircraft pairings are highly dependent upon munitions and fusing. In OIF for example, it was common for a flight of aircraft under one ATO mission number to have different combinations of munitions and fuse settings, but because TBMCS only displayed one configuration for the entire flight, duty officers and C2 agencies had to call units and flights directly to ask them their configuration. This increased the stress on already saturated communications links. Air Combat Command is currently working on this and other TBMCS improvements that will improve operational C4 and the CAOC's ability to track mission changes and execution progress.

BDA/ISR. The breadth of effort to fix what most experts consider to be a "broken" BDA process is well beyond the scope of this paper. However, the improvement of ADOCS functionality and the maturation of WEEMCs will improve the air component's ability to keep track of what has been engaged, which will at least provide a more complete and accurate list of what must be assessed for effects. Another way to attack the large ISR assessment burden is to place more emphasis on non-traditional ISR means. When LGBs were the primary US precision munition, immediate BDA was provided by the weapons system video (WSV) from the delivering platform's laser targeting pod (TGP). The widespread use of GPS weapons had the effect of negating a need for TGP illumination and significantly decreased the amount of immediate BDA information. The capability and accuracy of GPS weapons results in greater destructive efficiency; the same number of aircraft with GPS weapons can strike a far greater number of individual aimpoints. This efficiency places a greater burden on assessment by increasing the number of targets that have been struck over a given time period.

Some of the assessment burden can be assisted by a renewed emphasis on shooter BDA using on-board sensors and WSV. In hindsight, if the CFACC had directed TGP capable units/aircraft to accomplish post-strike WSV following GPS weapon delivery, a much larger quantity of initial BDA would have been available. Within 5 years the majority of USAF multi-role fighters and some of its bombers will carry some version of a TGP. The Block 50 F-16CJ units will be receiving Advanced Targeting Pod, while the remainder of the active, guard, and reserve fighter units will use various TGP versions. Navy F-14s and F/A-18s each have a TGP capability that can provide post-strike WSV. Additionally, to increase ISR capability to both find and assess targets there should be a renewed emphasis on using available US and coalition tactical reconnaissance. The UK Tornado GR-4 with the Reconnaissance Airborne Pod of Tornado (RAPTOR) worked well as a collection and assessment platform during OIF, and the USMC F/A-18 with Advanced Tactical Airborne Reconnaissance System (ATARS) had similar success. There is additional capability from the USN F/A-18 with the Shared Reconnaissance Pod (SHARP) and the USAF ANG F-16C with the Tactical Air Reconnaissance System (TARS).[86] Because of growing US capability to accurately engage large numbers of targets in a relatively shorter time period, there must be an increased emphasis on creatively utilizing all available means to assess the effects.

Adversary Focus on Asymmetric Operations

The Russian quote at the beginning of this chapter reinforces the earlier observation that other militaries are watching and learning from US combat operations. In the *Russian Academy of Military Sciences Analysis of the War in Iraq*, senior Russian military officers acknowledge that the current Russian military structure and methods of waging war can not oppose the "dynamic" nature of US operations. It also emphasizes a need to transition military operations, process, and organization, as well as to develop automated systems to enable dynamic operations. Their recommendations and observations sound very similar those the US made after the conclusion of OAF.

More importantly, the Russian's emphasized the importance of concealment and mobility to offset US conventional advantages. They cite the Iraqi use of equipment decoys, GPS jammers, and decoy radars as successful techniques to "maintaining their ability to wage combat."[87] Other

assessments offer that the conventional capability gap between the US and the rest of the world is growing, and that future adversaries will move to the conflict extremes in order to counter this asymmetric advantage.[88] These are not new lessons for potential US adversaries, and it is likely any military conflict in the future will be characterized by a reluctance to offer US forces lucrative stationary targets.

Joint and Coalition Training

One of the biggest lessons for the joint air component from OIF was the need to improve TST training at both the operational and tactical levels. The issue becomes even broader in that the two levels of training must be exercised together, and that merging them for the first time robustly during major theater war guarantees a slow start and less efficient process. The Center for Army Lessons Learned (CALL) observes that

> "Maneuver forces need a full range of fire support that can provide close, continuous (all-weather), responsive, accurate, precision and area fires. [This] requires close coordination and integration of air and ground capabilities to ensure the right system engages the right target with the right type of munitions."[89]

That type of close coordination and integration does not happen without practice. The different services have excellent individual training areas where they hone component skills in preparation for combat rotations. What is missing is robust training exercises that bring the services together and exercise both operational command and control and joint tactical integration. While it would be naïve to suggest that the wide variety of Coalition and Joint service members arriving for a contingency CAOC duty assignment could all be formally trained beforehand, it is paramount that the US core contingent have that training so that effective, formal on-the-spot training can be conducted to spin-up those added to the CAOC team at the last minute.

The US military must take aggressive steps to avoid losing the joint and coalition integration built since DESERT STORM. In his testimony before the HASC, General Tommy Franks credited the 10+ year's experience of NORTHERN WATCH and SOUTHERN WATCH as critical to improving US joint and combined interoperability, as well as command, control, computer, communications and intelligence architectures.[90] Both ONW and OSW provided a continuous opportunity for joint and coalition air forces to train together in a combat environment that was not duplicated anywhere else. As the major air operations of OIF wound down, one of the UK CAOC Directors of Combat Operations, Group Captain Steve Forward, expressed his concern that in the absence of ONW and OSW the US/UK integration and interoperability gains over the last 10 years would be lost unless there was something created to take the place of those operations.[91]

In order to get the level of training that stresses the AOC process to the level characteristic of a large operation, service and joint exercises should routinely include full-up operational level command and control (including an AOC). Outside of a scenario where actual C2 with airborne missions are ongoing, it is difficult to adequately simulate the chaos and friction of saturated communications. Likewise at the tactical level, it is difficult to simulate the communication delays from shooters to AOC if there is no AOC present at the other end of the communication

pipe. The OIF Director of the Combat Operations Division in the CAOC during OIF stressed in his briefing to the CFACC lessons conference the importance of taking the next step and integrating TST/Offensive Operations processes with robust training environments.[92]

Exercises must routinely incorporate immediate target prosecution as a normal part of ATO execution. In order to build aircrew habit patterns and basic dynamic targeting response familiarity required to successfully prosecute an air campaign against a non-cooperative adversary, MAJCOMs should incorporate immediate targeting process and execution into inspections. Wings and Numbered Air Forces (NAF) would then follow by including them into local exercises. The new TST MTTP stresses that "the key to shooter-level TST execution authority lies in effectively training the shooter during contingency planning on the proper correlation between acquired targets and ROE/CD directives."[93] Effective, relevant training builds the habit patterns and experience that are essential for effective, efficient combat operations. The quality of US joint and coalition training has been an asymmetric advantage for US joint forces. As potential adversaries adapt to counter conventional US military capabilities, so must the joint force adapt its training to include the immediate targeting paradigm it will encounter in combat.
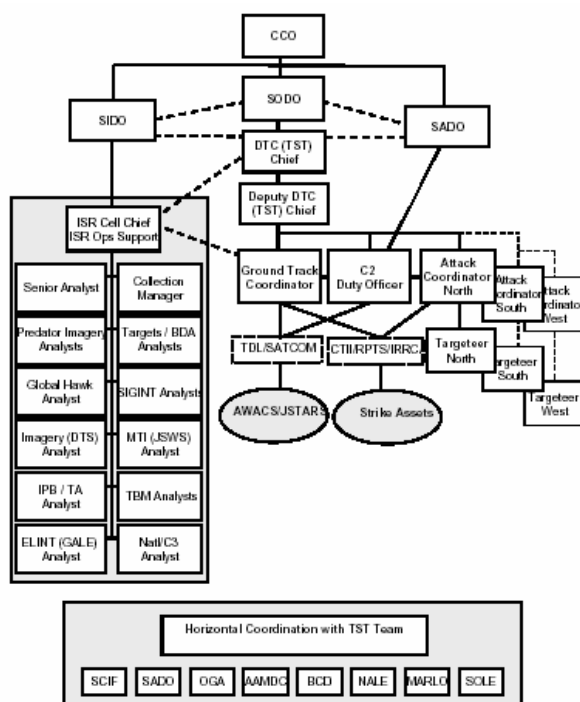

Figure 13. CAOC Current Operations Division[94]

Chapter 5

Conclusion

"One of the greatest challenges facing the Navy today is the ability to locate, track, and destroy mobile targets. For years, the joint intelligence centers and cruise missile support activities have focused on fixed targets, but as the Persian Gulf War and the recent Balkan conflict make clear, the time-critical targeting problem is the most difficult and often most important part of combat operations."

LCMDR Dan Shanower
"Naval Intelligence Must Focus on Time-Critical Targeting"
Proceedings of the United States Naval Institute[95]

The overwhelming US conventional military capability developed and fielded in the post-Vietnam period coupled with the outstanding professionalism and training of its soldiers, sailors, airmen, and marines has forced potential adversaries to rethink their approach to military operations against such a juggernaut. Taking note of the pounding that exposed Iraqi forces endured from coalition airpower during the first Gulf War, adversaries have been convinced they must adapt to more asymmetric strategies in order to preserve their military hardware and capability. As a result, the US military is increasingly encountering an enemy that disperses and conceals his military, uses deception and decoys, and employs shoot and hide tactics that make targeting those forces much more difficult and dependent upon an efficient F2T2EA process. That targeting process has been further complicated by the expectations of low friendly and non-combatant casualties and minimal collateral damage.

This paper has contrasted the various processes and relative success of immediate target prosecution during various conflicts using DESERT STORM as a point of departure. While the lessons from the Scud hunt did not energize the joint air community into creating immediate target doctrine and processes, they were used twelve years later to develop the comprehensive counter-Scud effort for IRAQI FREEDOM. The flex targeting process developed during ALLIED FORCE convinced key USAF senior leaders that the AOC needed an inherent capability to process critical immediate targets inside the normal ATO targeting cycle, and focused the joint development of doctrine, TTPs, datalink and C4ISR improvements. Still in its infancy, the time-sensitive and immediate target process became a standard AOC capability during ENDURING FREEDOM. More importantly, OEF TST cell personnel identified key process and doctrinal changes required to make immediate targeting viable in a large-scale conflict.

The joint immediate target process was tested within the crucible of major theater war during IRAQI FREEDOM, and by most measures was an outstanding success. Time-sensitive targeting and the other immediate targeting highlighted some lessons and provided a focus for further improving US operational-level execution. OIF lessons energized the USAF to reinforce organizational concepts and organize all AOC immediate targeting within a Dynamic Targeting Cell for unity of effort. There is a heightened joint emphasis on further improving automated processes and removing requirements for any manual transfer of data between applications, a task that OIF proved unrealistic during the pace of major sustained combat air operations.

There must be an increased effort to educate the joint air component on effects-based operations so that any remaining vestiges of the mindset of bombing for bombings sake can be erased by operational and tactical level airman smart on the objective effect for any given operation. And finally, the US joint community in concert with our traditional allies must take immediate action to develop a new training paradigm that routinely integrates operational command, control, and communications with tactical-level execution. This training environment must incorporate immediate target scenarios as a <u>normal</u> and expected occurrence during execution, since future adversaries will likely employ similar asymmetric counters to US conventional dominance.

Bibliography

Air Force Operational Tactics, Techniques, Procedures (AFTTPI) 2-3.2 (Review Draft). *Air and Space Operations Center*, December 2003.

Air Force Tactics, Techniques, Procedures (AFTTPI) 3.2-3 (Final Draft). *TST: Multi-Service Procedures for Targeting Time-Sensitive Targets*, November 2003.

Berezkin, Major-General G. A. *Russian Academy of Military Sciences Analysis of War in Iraq*. Transcript of essays presented by Russian Academy of Military Sciences Scientific Council, 6 June 2003. n.p. On-line. Internet, 30 October 2003. Available from https://portal.rccb.osis.gov/index.jsp.

Chaisson, Kernan. "MNF Addresses Time-Critical Targeting." *Journal of Electronic Defense*, Vol. 24, Issue 5 (May 2001): 16.

Cohen, Eliot A., dir. *Gulf War Air Power Survey Summary Report*. Washington, DC: U.S. Government Printing Office, 1993.

Cook, Nick. "Cause and Effect." *Jane's Defence Weekly,* Vol. 39, No. 24 (18 June 2003): 52-57.

Cone, Brig Gen Robert W. Pentagon Briefing on Joint Lessons Learned from Operation IRAQI FREEDOM, 2 October 2003. n.p. On-line. Internet, 7 October 2003. Available from http://www.defenselink.mil/transcripts/2003/tr20031002-0727.html.

Conetta, Carl. "Catastrophic Interdiction: Air Power and the Collapse of the Iraqi Field Army in the 2003 War." *Project on Defense Alternatives Briefing Memo #30*, 26 September 2003.

Cordesman, Anthony H. *The Iraq War: Strategy, Tactics, and Military Lessons*. Washington, D.C.: Center for Strategic and International Studies, 2003.

Cordesman, Anthony H. *Understanding the New "Effects-based Air War in Iraq*." Washington, D.C.: Center for Strategic and International Studies, 15 March 2003.

Crowder, Gary L. "Effects-Based Operations." *Military Technology*, Vol. 27, Issue 6 (June 2003): 16-25.

Danskine, Maj William B. "Time-Sensitive Targeting Model." *Air and Space Power Chronicles*, 11 April 2001, n.p. On-line. Internet, 7 December 2003. Available from http://www.airpower.maxwell.af.mil/airchronicles/cc/Danskine.html.

Deptula, Maj Gen David A., Gary L. Crowder,; and Maj George L. Stamper Jr. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations." *Air and Space Power Journal*, Winter 2003, n.p. On-line. Internet, 2 December 2003. Available from http://www.airpower.maxwell.af.mil/airchronicles/apj/apj03/win03/win03.html.

Deptula, Maj Gen David A. and Lt Col Sigfred J. Dahl. "Transforming Joint Air-Ground Operations for 21st Century Battlespace." *Field Artillery*, July-August 2003, 21-25.

Downing, Mair. "Joint Forces Command Spearheading War's Lessons Learned Process." *United States Joint Forces Command*, 4 May 2003, n.p. On-line. Internet, 29 September 2003. Available from http://www.jfcom.mil/newslink/storyarchive/2003/pa060403a.htm.

Erwin, Sandra I. "Experimental Battle-Planning Software Rushed to Iraq." *National Defense*, October 2003, n.p. On-line. Internet, 7 December 2003. Available from http://www.nationaldefensemagazine.org/article.cfm?Id=1216.

Erwin, Sandra I. "Navy Aviation: Skills Surpass Smart Weapons." *National Defense*, October 2003, n.p. On-line. Internet, 7 December 2003. Available from http://www.nationaldefensemagazine.org/article.cfm?Id=923.

Franks, Gen Tommy R. Testimony to the Senate Armed Services Committee on Lessons Learned during Operations ENDURING FREEDOM and IRAQI FREEDOM, 9 July 2003. n.p. On-line. Internet, 7 October 2003. Available from http://www.senate.gov/~armed_services/testimony.cfm?wit_id=142&id=843.

Franks, Gen Tommy R. *Lessons Learned from the Top*. Redacted from testimony to the House Armed Services Committee on Lessons Learned during Operation IRAQI FREEDOM, 10 July 2003. n.p. On-line. Internet, 30 September 2003. Available from https://call2.leavenworth.army.mil/oif/docs/lessons.franksll.asp.

Fyfe, Lt Col John M. "Operation IRAQI FREEDOM: CAOC Offensive Operations Team Lessons Learned." Briefing at CFACC Lessons Learned Conference, Nellis AFB NV, 9 July 2003, n.p.

Garamone, Jim. "Joint Ops Key to Military Lessons Learned from Iraq." *Air Force Print News*, 9 July 2003, n.p. On-line. Internet, 1 October 2003. Available from http://www.au.af.mil/au/awc/awcgate/af/20030731news-oif.htm.

Garrett, Major. "Military Learns Lessons from Operation IRAQI FREEDOM." *Fox News Channel Online*, 24 April 2003, n.p. On-line. Internet, 1 October 2003. Available from http://www.foxnews.com/story/0,2933,85003,00.html.

Grant, Rebecca. *Gulf War II: Air and Space Power Led the Way*. *Air Force Association Special Report*. Arlington, VA: Aerospace Education Foundation, 2003.

Haag, SSgt Jason L. *OIF Veterans Discuss Lessons*. *Air Force Print News*, 31 July 2003, n.p. On-line. Internet, 30 September 2003. Available from http://www.au.af.mil/au/awc/awcgate/af/20030731news-oif.htm.

Haave, Col Chris E. "DCO Observations." Briefing at CFACC Lessons Learned Conference, Nellis AFB, NV, 9 July 2003, n.p. On-line. Internet, 18 December 2003.

Hazelgrove, Allen P. "Desert Storm Time-Sensitive Targeting: A Successful Failure or a Failed Success?" *Defense Analysis*, Vol. 16, Issue 2 (August 2000): 113-150.

Hebert, Adam J. "Compressing the Kill Chain." *Air Force Magazine*, March 2003, 50-54.

Hodgdon, Col Jeffery A. "Time Sensitive Targeting: Operation IRAQI FREEDOM." (U) Briefing at CFACC Lessons Learned Conference, Nellis AFB, NV, 9 July 2003, n.p. On-line. Internet, 18 December 2003. Information extracted is unclassified.

Hollis, Patrecia S. "CENTCOM: Targeting in a Unified Command." *Field Artillery*, Issue 3 (May-June 2001): 2-5.

Horner, Lt Gen Charles. "An Oral History, The Commanders, Interview with Lieutenant General Chuck Horner, Joint Forces Air Component Commander," *Frontline, The Gulf War*, 1991, n.p. On-line. Internet, 9 January 2004. Available from http://www.pbs.org/wgbh/pages/frontline/gulf/oral/horner/2.html

Ingram, Bernd J. "Joint Targeting for Time-Sensitive Targets." *Field Artillery*, Issue 3 (May-June 2001): 28-30.

Joint Forces Command. *Commander's Handbook for Joint Time-Sensitive Targeting*, 22 March 2002. Available from http://handle.dtic.mil/100.2/ada403414.

Joint Publication 1-02. *DOD Dictionary of Military and Associated Terms*, 12 April 2001 (As amended through 17 December 2003).

Joint Publication 3-60. *Joint Doctrine for Targeting*, 17 January 2002.

Knights, Michael. "Iraqi Freedom Displays the Transformation of US Air Power." *Jane's Intelligence Review*, Vol. 15, No. 5 (May 2003): 16-19.

Knights, Michael. "USA Learns Lessons in Time-Critical Targeting." *Jane's Intelligence Review*, Vol. 15, No. 7 (July 2003): 33-34.

Krepinevich, Andrew F. *Operation IRAQI FREEDOM: A First-Blush Assessment*. Washington, DC: Center for Strategic and Budgetary Assessments, 2003.

Lambeth, Benjamin S. *NATO's Air War for Kosovo*. Santa Monica, CA: RAND, 2001.

Lambeth, Benjamin S. *The Transformation of American Air Power*. Ithaca, NY: Cornell University Press, 2000.

Larson, Lt Col Mark S. "Operation IRAQI FREEDOM: Combat Ops Lessons Learned." Briefing, May 2003, n.p.

Lenhardt, Tom. "Joint Fires Initiative Aids Time-Sensitive Targeting." *Proceedings of the United States Naval Institute*, Vol. 129, Issue 9 (September 2003): 85-86.

LaVella, Leonard. *Operation Enduring Freedom Time Sensitive Targeting Process Study* (Langley AFB, VA: ACC/DRY, 15 August 2003). Document is Unclassified.

Morehouse, Brig Gen Jim. "Time Critical Targeting." Briefing to National Defense Industrial Association 2002 DOD Interoperability Conference, 26 March 2002, n.p. Online. Internet, 1 October 2003. Available from http://www.dtic.mil/ndia/2002interop/morehouse.pdf.

Nash, Maj Gen Gordon C. and Brig Gen Robert W. Cone. DOD Briefing on Operation IRAQI FREEDOM Lessons Learned Process, 3 June 2003. n.p. On-line. Internet, 1 October 2003. Available from http://www.au.af.mil/au/awc/awcgate/dod/tr20030603-0243.htm.

Operation IRAQI FREEDOM (OIF) Emerging Observations, Insights, and Lessons. Center for Army Lessons Learned, 2003, n.p. On-line. Internet, 7 October 2003. Available from https://call2.leavenworth.army.mil/oif/docs/briefings/EmergingObs_files/slide0111.asp.

Operation IRAQI FREEDOM: By the Numbers. USCENTAF, Assessment and Analysis Division. Shaw AFB, SC, 30 April 2003. On-line. Internet, 7 October 2003. Available from http://www.au.af.mil/au/awc/awcgate/af/oifcentaf.pdf.

Operation IRAQI FREEDOM: CENTAF-PSAB Combined Air Operations Center Offensive Operations Team Lessons Learned. 609th Combat Operations Squadron. Shaw AFB, SC, 19 June 2003.

Orban, TSgt Brian. "Time-Sensitive Targeting Adds Combat Flexibility." *Operation IRAQI FREEDOM Print News*, 18 April 2003, n.p. On-line. Internet, 29 September 2003. Available from http://www.af.mil/search/story_print_ops.asp?storyID=4180393.

Perryman, Maj Gen and Vice Admiral McGinn. "USAF Time Critical Targeting and USN Time Critical Strike." Briefing at 2001 Navy-Air Force Warfighter Talks, 2001.

Pustam, Anil R. "Just-in-Time Targeting." *Journal of Electronic Defense*, Vol. 26, Issue 4 (April 2003): 51-56.

Rochelle, Lt Col Jeffery. "Time Sensitive Targeting 20 March-12 April 2003: Operation IRAQI FREEDOM." (U) Briefing to CENTAF-A3, Prince Sultan AB KSA, 25 April 2003.

Rumsfeld, Donald H. Testimony to the Senate Armed Services Committee on Lessons Learned during Operations ENDURING FREEDOM and IRAQI FREEDOM, 9 July 2003. n.p. On-line. Internet, 7 October 2003. Available from http://www.senate.gov/~armed_services/testimony.cfm?wit_id=187&id=843.

Shaber, Maj Mark, Capt Scott Hedberg, and Troy Wesson. *V Corps: After Action Report (AAR) on Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Integration (U)*. Center for Army Lessons Learned, May 2003. n.p.

On-line. Internet, 30 September 2003. Available from
https://call2.leavenworth.army.mil/fouo/documents/OIF/Vcorps/toc.asp.

Shanower, LCMDR Dan. "Naval Intelligence Must Focus on Time-Critical Targeting."
Proceedings of the United States Naval Institute, Vol. 126, Issue 10 (October 2000):
102-103.

Streetly, Martin. "Airborne Surveillance Assets Hit the Spot in Iraq." *Jane's Intelligence Review*,
Vol. 15, No. 7 (July 2003): 34-37.

Stutz, CPO Douglas H. "CFACC Provides Guidance for Air Campaign." *USAF Ops Center
News*, March 2003, n.p. On-line. Internet, 29 September 2003. Available from
http://www.af.mil/news/opscenter/caoc_special5.shtml.

Tirpak, John A. "Find, Fix, Track, Target, Engage, Assess." *Air Force Magazine Online*, Vol.
83, No. 7 (July 2003): n.p. On-line. Internet, 29 September 2003.

Tucker, Vic. "Targeting Concept." Air Force C2 Battlelab/FATE, 14 June 2000.

UK Ministry of Defence, *Operations in Iraq: First Reflections*, July 2003.

Waller, LTG Calvin. "An Oral History, The Commanders, Interview with Lieutenant General
Calvin Waller, Deputy Commander of CENTCOM." *Frontline, The Gulf War*, 1991, n.p.
On-line. Internet, 9 January 2004. Available from
http://www.pbs.org/wgbh/pages/frontline/gulf/oral/waller/1.html.

End Notes

[1] Lt Gen Charles Horner, "An Oral History, The Commanders, Interview with Lieutenant General Chuck Horner, Joint Forces Air Component Commander," *Frontline, The Gulf War*, 1991, n.p., on-line, internet, 9 January 2004, available from http://www.pbs.org/wgbh/pages/frontline/gulf/oral/horner/2.html.

[2] Joint Publication 1-02, *DOD Dictionary of Military and Associated Terms*, 12 April 2001 (As amended through 17 December 2003), 538.

[3] Allen P. Hazelgrove, "Desert Storm Time-Sensitive Targeting: A Successful Failure or a Failed Success?" *Defense Analysis*, Vol. 16, Issue 2 (August 2000), 113.

[4] Major Garrett, "Military Learns Lessons from Operation IRAQI FREEDOM," *Fox News Channel Online*, 24 April 2003, n.p., on-line, internet, 1 October 2003, available from http://www.foxnews.com/story/0,2933,85003,00.html.

[5] CPO Douglas H. Stutz, "CFACC Provides Guidance for Air Campaign," *USAF Ops Center News*, March 2003, n.p., on-line, internet, 29 September 2003, available from http://www.af.mil/news/opscenter/caoc_special5.shtml.

[6] Maj William B. Danskine, "Time-Sensitive Targeting Model," *Air and Space Power Chronicles*, 11 April 2001, 3, on-line, internet, 7 December 2003, available from http://www.airpower.maxwell.af.mil/airchronicles/cc/Danskine.html.

[7] Ibid. Danskine's paper is an excellent primer on the TST process.

[8] LTG Calvin Waller, "An Oral History, The Commanders, Interview with Lieutenant General Calvin Waller, Deputy Commander of CENTCOM," *Frontline, The Gulf War*, 1991, n.p., on-line, internet, 9 January 2004, available from http://www.pbs.org/wgbh/pages/frontline/gulf/oral/waller/3.html.

[9] Author's experience. On 20 January 1991 an 18-ship strike package from the 363rd TFW was reroled to search and attack mobile Scud launchers in the vicinity of Al Quaim, Iraq. Other than coordinates, the aircrew were given no other description of the target area. The package was heavily engaged by unreported SA-2 and SA-3 surface-to-air missile systems, while no Scud launchers were located. Transit time to the target area from initial tasking was approximately 6 hours, during which no target updates were passed to the package.

[10] Hazelgrove, 132, and Eliot A. Cohen, dir., *Gulf War Air Power Survey Summary Report* (Washington, DC:US Government Printing Office, 1993), 84.

[11] Waller.

[12] Hazelgrove, 132.

[13] Ibid., 134.

[14] Benjamin S. Lambeth, *The Transformation of American Air Power* (Ithaca, NY: Cornell University Press, 2000), 183.

[15] Ibid.

[16] Ibid., 202.

[17] Benjamin S. Lambeth, *NATO's Air War for Kosovo* (Santa Monica, CA: RAND, 2001), 122.

[18] Ibid.

[19] Ibid., 121.

[20] Lambeth, *The Transformation of American Air Power*, 203.

[21] Lambeth, *NATO's Air War for Kosovo*, 127.

[22] Ibid., 131. The SECDEF *After-action Report* claimed valid strikes on 93 tanks, 153 armored personnel carriers, 389 artillery and mortar pieces, and 339 other military equipment.

[23] Ibid., 124-126, and Lambeth, *The Transformation of American Air Power*, 202-204.

[24] Lambeth, *The Transformation of American Air Power*, 228.

[25] Ibid., 205.

[26] Brig Gen Jim Morehouse, "Time Critical Targeting," Briefing to National Defense Industrial Association 2002 DOD Interoperability Conference, 26 March 2002, slide 6, online, internet, 1 October 2003, available from http://www.dtic.mil/ndia/2002interop/morehouse.pdf.

[27] Vic Tucker, "Targeting Concept," Air Force C2 Battlelab/FATE, 14 June 2000.

[28] John A. Tirpak, "Find, Fix, Track, Target, Engage, Assess," *Air Force Magazine Online*, Vol. 83, No. 7 (July 2003): n.p., on-line, internet, 29 September 2003.

[29] Brig Gen Jim Morehouse, "Time Critical Targeting," Briefing to National Defense Industrial Association 2002 DOD Interoperability Conference, 26 March 2002, slide 6, online, internet, 1 October 2003, available from http://www.dtic.mil/ndia/2002interop/morehouse.pdf.

[30] Bernd J. Ingram, "Joint Targeting for Time-Sensitive Targets," *Field Artillery*, Issue 3 (May-June 2001): 28.

[31] Patrecia S. Hollis, "CENTCOM: Targeting in a Unified Command," *Field Artillery*, Issue 3 (May-June 2001): 4.

[32] Ingram, 30.

[33] Sandra I. Erwin, "Navy Aviation: Skills Surpass Smart Weapons," *National Defense*, October 2003, n.p., on-line, internet, 7 December 2003, available from http://www.nationaldefensemagazine.org/article.cfm?Id=923, and Col Jeffrey A. Hodgdon, Chief OIF TST Team, Nellis AFB, NV, interviewed by author, 3 February 2004.

[34] Gen Tommy R. Franks, *Lessons Learned from the Top*, redacted from testimony to the House Armed Services Committee on Lessons Learned during Operation IRAQI FREEDOM, 10 July 2003, n.p., on-line, internet, 30 September 2003, available from https://call2.leavenworth.army.mil/oif/docs/lessons.franksll.asp.

[35] Leonard LaVella, *Operation Enduring Freedom Time Sensitive Targeting Process Study* (Langley AFB, VA: ACC/DRY, 15 August 2003), 12.

[36] Ibid., 23.

[37] Ibid., 12-14.

[38] Ibid., 25.

[39] Ibid., 28.

[40] UK Ministry of Defence, *Operations in Iraq: First Reflections*, July 2003, 21.

[41] Joint Publication 3-60, *Joint Doctrine for Targeting*, 17 January 2002, B-1.

[42] Ibid., I-5.

[43] Ibid., I-2-3.

[44] Ibid., GL-6.

[45] Joint Forces Command, Commander's *Handbook for Joint Time-Sensitive Targeting*, 22 March 2002, II-4, III-4—III-7, available from http://handle.dtic.mil/100.2/ada403414.

[46] Maj Gen Perryman and Vice Admiral McGinn, "USAF Time Critical Targeting and USN Time Critical Strike," Briefing at 2001 Navy-Air Force Warfighter Talks, 2001.

[47] Morehouse, slide 12, and Adam J. Hebert, "Compressing the Kill Chain," *Air Force Magazine*, March 2003, 52-53.

[48] Hebert, 52-53.

[49] Tom Lenhardt, "Joint Fires Initiative Aids Time-Sensitive Targeting," Proceedings of the United States Naval Institute, Vol. 129, Issue 9 (September 2003): 85. Because of software permissions problems with JTT during OIF, RTL and NSL information was pulled from JTT into Excel spreadsheets and then transferred into ADOCs.

[50] Sandra I. Erwin, "Experimental Battle-Planning Software Rushed to Iraq," National Defense, October 2003, n.p., on-line, internet, 7 December 2003, available from http://www.nationaldefensemagazine.org/article.cfm?Id=1216.

[51] Hodgdon, interview.

[52] Lt Col Jeffery Rochelle, "Time Sensitive Targeting 20 March-12 April 2003: Operation IRAQI FREEDOM," (U) Briefing to CENTAF-A3, Prince Sultan AB KSA, 25 April 2003.

[53] Col Jeffery A. Hodgdon, "Time Sensitive Targeting: Operation IRAQI FREEDOM," (U) Briefing at CFACC Lessons Learned Conference, Nellis AFB, NV, 9 July 2003, n.p., on-line, internet, 18 December 2003.

[54] Rebecca Grant, *Gulf War II: Air and Space Power Led the Way*, Air Force Association Special Report, Arlington, VA: Aerospace Education Foundation, 2003, 15.

[55] *Operation IRAQI FREEDOM: By the Numbers*, USCENTAF, Assessment and Analysis Division, Shaw AFB, SC, 30 April 2003, 11, on-line, internet, 7 October 2003, available from http://www.au.af.mil/au/awc/awcgate/af/oifcentaf.pdf. The majority of CENTAF-prosecuted immediate targets were struck with variants of Joint Direct Attack Munition (JDAM), Joint Standoff Weapon (JSOW), Wind-Corrected Munitions Dispenser, and laser-guided bombs.

[56] Air Force Tactics, Techniques, Procedures (AFTTPI) 3.2-3 (Final Draft), *TST: Multi-Service Procedures for Targeting Time-Sensitive Targets*, November 2003, III-5.

[57] Rochelle, slide 4.

[58] *Operation IRAQI FREEDOM: By the Numbers*, 2, 7-9.

[59] The Intra-AOC Target Manager (ITM) was the module in ADOCs used to track targets worked by the CAOC TST Team.

[60] Adapted from *OIF: By the Numbers*, 9 and Rochelle.

[61] Anthony H. Cordesman, *The Iraq War: Strategy, Tactics, and Military Lessons*, Washington, DC: Center for Strategic and International Studies, 2003, 281, and Hodgdon interview.

[62] Adapted from *OIF: By the Numbers*, 9.

[63] Adapted from Rochelle.

[64] Ibid.

[65] Ibid.

[66] TSgt Brian Orban, "Time-Sensitive Targeting Adds Combat Flexibility," *Operation IRAQI FREEDOM Print News*, 18 April 2003, n.p., on-line, internet, 29 September 2003, available from http://www.af.mil/search/story_print_ops.asp?storyID=4180393.

[67] Prior to that, single-role USAF F-15C's manned the majority of DCA CAPs in the south and west.

[68] Martin Streetly, "Airborne Surveillance Assets Hit the Spot in Iraq," *Jane's Intelligence Review*, Vol. 15, No. 7 (July 2003): 36.

[69] Donald H. Rumsfeld, Testimony to the Senate Armed Services Committee on Lessons Learned during Operations ENDURING FREEDOM and IRAQI FREEDOM, 9 July 2003, n.p., on-line, internet, 7 October 2003, available from http://www.senate.gov/~armed_services/testimony.cfm?wit_id=187&id=843.

[70] Ibid.

[71] Maj Mark Shaber, Capt Scott Hedberg, Troy Wesson, V Corps: After Action Report (AAR) on Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Integration (U), Center for Army Lessons Learned, May 2003.

[72] For a statistical study on the OIF efficiency of US airpower compared to ODS results reference Carl Conetta, "Catastrophic Interdiction: Air Power and the Collapse of the Iraqi Field Army in the 2003 War," *Project on Defense Alternatives Briefing Memo #30*, 26 September 2003. In this paper Conetta establishes that while Iraqi unit personnel attrition was lower that ODS, the attrition *rate* was higher (i.e. killing/destroying the enemy faster over a shorter time period).

[73] Lt Col John M. Fyfe, "Operation IRAQI FREEDOM: CAOC Offensive Operations Team Lessons Learned," Briefing at CFACC Lessons Learned Conference, Nellis AFB NV, 9 July 2003, n.p.

[74] AFOTTP 2.3.2 *AOC* and CSAF-approved *AF Forces C2* CONOPS organizes TST within Offensive Operations.

[75] Anthony H. Cordesman, *Understanding the New "Effects-based Air War in Iraq*," Washington, DC: Center for Strategic and International Studies, 15 March 2003, 3.

[76] Orban.

[77] Gary L. Crowder, "Effects-Based Operations," Military Technology, Vol. 27, Issue 6 (June 2003): 23.

[78] The CFC wanted them hit because he was informed that rotors could be reassembled on the helicopters in less than 6 hours—so he believed them to be a valid threat.

[79] Major-General G. A. Berezkin, *Russian Academy of Military Sciences Analysis of War in Iraq*, Transcript of essays presented by Russian Academy of Military Sciences Scientific Council, 6 June 2003, n.p., on-line, internet, 30 October 2003, available from https://portal.rccb.osis.gov/index.jsp.

[80] Maj Gen Gordon C. Nash and Brig Gen Robert W. Cone, DOD Briefing on Operation IRAQI FREEDOM Lessons Learned Process, 3 June 2003, n.p., on-line, internet, 1 October 2003, available from http://www.au.af.mil/au/awc/awcgate/dod/tr20030603-0243.htm.

[81] Lt Col Mark S. Larson, "Operation IRAQI FREEDOM: Combat Ops Lessons Learned," Briefing, May 2003, n.p.

[82] Also designated FM 3-60.1, MCRP 3-16D, and NTTP 3-60.1.

[83] Adapted from Hodgdon, "TST 20 March-12 April 2003: OIF."

[84] Air Force Operational Tactics, Techniques, Procedures (AFTTPI) 2-3.2 (Review Draft), *Air and Space Operations Center*, December 2003, 5-39.

[85] Lt Col Gary Backes, Chief AOC Tactics and Innovation, Hurlburt AFB, FL, interviewed by author, 12 January 2004, and Hodgdon interview.

[86] Anil R. Pustam, "Just-in-Time Targeting," *Journal of Electronic Defense*, Vol. 26, Issue 4 (April 2003): 52.

[87] Berezkin.

[88] Andrew F. Krepinevich, *Operation IRAQI FREEDOM: A First-Blush Assessment*, Washington, DC: Center for Strategic and Budgetary Assessments, 2003, 10-11.

[89] *Operation IRAQI FREEDOM (OIF) Emerging Observations, Insights, and Lessons*, Center for Army Lessons Learned, 2003, n.p., on-line, internet, 7 October 2003, available from https://call2.leavenworth.army.mil/oif/docs/briefings/EmergingObs_files/slide0111.asp.

[90] Gen Tommy R. Franks, *Lessons Learned from the Top*, redacted from testimony to the House Armed Services Committee on Lessons Learned during Operation IRAQI FREEDOM, 10 July 2003, n.p., on-line, internet, 30 September 2003, available from https://call2.leavenworth.army.mil/oif/docs/lessons.franksll.asp.

[91] Group Captain Stephen Forward (RAF), CAOC Director of Combat Operations, Nellis AFB, NV, interviewed by author July 2003.

[92] Col Chris E. Haave, "DCO Observations," Briefing at CFACC Lessons Learned Conference, Nellis AFB, NV, 9 July 2003, n.p.

[93] AFTTP(I) 3.2-3 (Final Draft), III-3.

[94] AFTTP(I) 3.2-3 (Final Draft), A-5.

[95] LCMDR Dan Shanower, "Naval Intelligence Must Focus on Time-Critical Targeting," *Proceedings of the United States Naval Institute*, Vol. 126, Issue 10 (October 2000): 102.

BIOGRAPHY
UNITED STATES AIR FORCE

COLONEL JOHN M. FYFE

Col Fyfe graduated in 1984 from Virginia Tech with a Bachelor of Science Degree in Electrical Engineering, and was commissioned as a Distinguished Graduate from the Air Force ROTC program. He received a Master of Aeronautical Science Degree from Embry-Riddle Aeronautical University in 1989. He completed SOS by correspondence in 1988, ACSC in residence in 1997, and received a Masters of Strategic Studies from Air War College in 2004.

Col Fyfe began his Air Force career as a student in Undergraduate Pilot Training at Vance AFB, OK. After completing UPT as a Distinguished Graduate in 1986, he attended Lead-In Fighter Training at Holloman AFB, NM, followed by initial F-16 training at Luke AFB, AZ. His first operational assignment was to the 512th Tactical Fighter Squadron at Ramstein AB, Germany in April 1987. He served as Assistant Weapons and Tactics Officer, and was a member of the Nuclear Mission Planning Cell. He completed the Four-Ship flight lead upgrade program as a lieutenant.

In April 1989 Col Fyfe transferred to the 17th Tactical Fighter Squadron at Shaw AFB, SC. After completing upgrades to Instructor Pilot and Mission Commander, he served as the squadron's Stan Eval Liaison Officer and then as wing Stan Eval Flight Examiner. He served as Chief of the wing combat Mission Planning Cell for the Day 1 missions of Desert Storm, and led 39 combat missions over Iraq and Kuwait during the war. At the end of the war, he was selected to attend the F-16 Fighter Weapons Instructor Course at Nellis AFB, NV. Upon his graduation from FWIC in 1991, Col Fyfe returned to Shaw and served as the Assistant Chief, Wing Weapons and Tactics, and then as Flight Commander in the 17th FS. In January 1993 he returned to Nellis as an F-16 Instructor Pilot at the Weapons School. While there, he served as the Air Defense Exercise officer, Air Combat Maneuvering and Air Combat Tactics Phase Managers, Air Combat Tactics Academic Instructor, Air-to-Air Flight Commander, and finally as an Assistant Operations Officer.

In October 1995 Col Fyfe joined the staff of Air Combat Command as the Advanced Air-to-Air Programs Manager for the Directorate of Requirements, and was responsible for defining the warfighting requirements for future air-to-air weapons and delivery platforms. Following his tour at Langley, in July 1997 Col Fyfe attended Air Command and Staff College at Maxwell AFB, AL.

In September 1998 Col Fyfe was assigned to the 20th Operations Support Squadron, 20th Fighter Wing, Shaw AFB, SC as the Weapons and Training Flight Commander. In December 1999, he was selected as Operations Officer, 78th Fighter Squadron and served in that position until September 2001.

From November 2001 to November 2002 Col Fyfe commanded the 80th Fighter Squadron, 8th FW, Kunsan AB ROK. Following his command he was assigned as Operations Officer, 609th Combat Operations Squadron, Shaw AFB, SC. During Operation IRAQI FREEDOM, he served as the Offensive Operations Team Chief and Senior Offensive Duty Officer in the Combined Air Operations Center, Prince Sultan Air Base, Kingdom of Saudi Arabia.

Col Fyfe is currently the Champion, Global Persistent Attack CONOPS Division, Headquarters Air Force Operational Plans and Joint Matters Directorate.

Col Fyfe is a command pilot with more than 3,100 hours in the F-16. He has flown during Operations DESERT SHIELD/STORM, and both NORTHERN and SOUTHERN WATCH. He has received the Distinguished Flying Cross, the Defense Meritorious Service Medal, the Meritorious Service Medal with 4 oak leaf clusters, and the Air Medal with 4 oak leaf clusters. He is married to the former Kristen Guter of Freehold, NJ. They have one daughter, Kayla (10), and one son, Trevor (8).

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